United States
Department of
Agriculture

Natural
Resources
Conservation
Service

In cooperation with
Purdue University
Agricultural Experiment
Station and the Indiana
Department of Natural
Resources, State Soil
Conservation Board and
Division of Soil
Conservation

Soil Survey of Tippecanoe County, Indiana

How To Use This Soil Survey

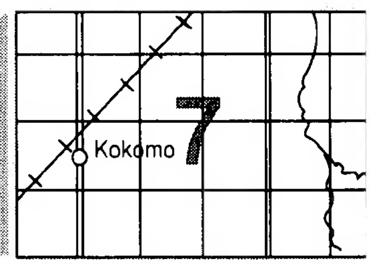
General Soil Map

The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

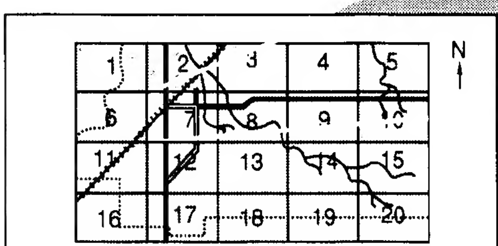
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.



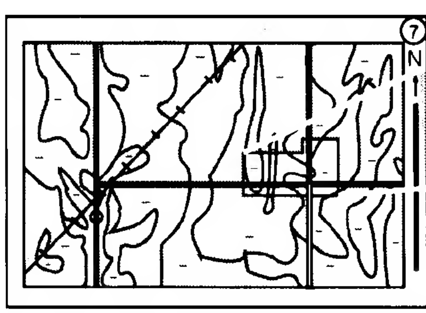
MAP SHEET

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.

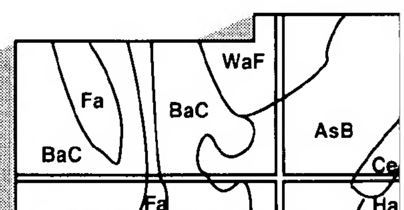


INDEX TO MAP SHEETS

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.



MAP SHEET



AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed during the period from 1983 to 1986. Soil names and descriptions were approved in 1987. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1987. This survey was made cooperatively by the Natural Resources Conservation Service, the Purdue University Agricultural Experiment Station, and the Indiana Department of Natural Resources, State Soil Conservation Board and Division of Soil Conservation. It is part of the technical assistance furnished to the Tippecanoe County Soil and Water Conservation District. Financial assistance was provided by the Board of County Commissioners of Tippecanoe County.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

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Cover: Corn in an area of Mahalasville silty clay loam, gravelly substratum, and alfalfa in an area of Desker sandy loam, kame, 6 to 12 percent slopes, eroded.

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Issued 1998

Index to Map Units

Summary of Tables

Foreword

This soil survey contains information that can be used in land-planning programs in Tippecanoe County, Indiana. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Robert L. Eddleman
State Conservationist
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Soil Survey of
Tippecanoe County, Indiana

By Thomas R. Ziegler, Natural Resources Conservation Service, and Douglas R. Wolf, Division of Soil Conservation, Indiana Department of Natural Resources

Fieldwork by Thomas R. Ziegler, Robert C. Wingard, Jr., Kendall M. McWilliams, and Earnest L. Jensen, Natural Resources Conservation Service; Douglas R. Wolf, Mark S. McClain, Randy J. Braun, Edwin A. Taylor, and Larry Osterholz, Division of Soil Conservation, Indiana Department of Natural Resources; and Michael H. Ebinger, Purdue University

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
Purdue University Agricultural Experiment Station and the Indiana Department of Natural Resources, State Soil Conservation Board and Division of Soil Conservation

Tippecanoe County is in west-central Indiana (fig. 1). It has a land area of 322,000 acres, or 503 square miles. The county extends about 24 miles from north to south and 21 miles from west to east. Lafayette, the county seat, is in the central part of the county. The population of Tippecanoe County is about 122,000.

About 81 percent of the county is farmed. Grain is the principal crop. Hogs, beef cattle, sheep, and a few dairy cattle are raised in the county, and the county has a few truck farms. Because of urban and industrial development, the acreage of farmland is continually decreasing.

This survey updates the soil survey of Tippecanoe County published in 1959 (Ulrich and others, 1959). It provides additional information and has larger maps, which show the soils in greater detail.

General Nature of the County

This section provides some general information about Tippecanoe County. It describes climate; history; physiography, relief, and drainage; water supply; and transportation facilities and industries.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Lafayette, Indiana, in the period 1961 to 1990. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 26 degrees F and the average daily minimum temperature is 17 degrees. The lowest temperature on record, which occurred at Lafayette on December 22, 1989, is -25 degrees. In summer, the average temperature is 72 degrees and the average daily maximum temperature is 83 degrees. The highest recorded temperature, which occurred at Lafayette on July 15, 1954, is 106 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 36.03 inches. Of this, 21.57 inches, or about 60 percent, usually falls in April

Figure 1.—Location of Tippecanoe County in Indiana.

through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 4.14 inches at Lafayette on May 26, 1989. Thunderstorms occur on about 43 days each year, and most occur in July.

The average seasonal snowfall is 22.4 inches. The greatest snow depth at any one time during the period of record was 17 inches. On the average, 37 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 62 percent. Humidity is higher at night, and the average at dawn is about 83 percent. The sun shines 67 percent of the time possible in summer and 43 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 11.7 miles per hour, in March.

History

The first European settlement in Indiana was established in 1717 at Fort Ouiatenon, 4 miles south of Lafayette on the Wabash River. This fort was built by the French to protect traders and trappers. The English captured the fort in 1763 and again in 1779 during the American Revolution. In 1791, the fort was destroyed. In 1811, the Battle of Tippecanoe was fought at Battle Ground. In this battle, General William Henry Harrison and his small army defeated a group of Indians led by the Prophet, brother of Tecumseh.

The first permanent settlers came to the survey area in 1822. Lafayette was laid out in 1825. It was named for the French general, the Marquis de Lafayette. Tippecanoe County was established in 1826. West Lafayette was first established in 1845 as the village of Kingston. It was renamed Chauncey and was finally named West Lafayette in 1888.

The Wabash and Erie Canal was constructed during the 1830's and 1840's. The canal reached Lafayette in 1843. The first railroad reached Tippecanoe County in 1851.

Physiography, Relief, and Drainage

Tippecanoe County is mainly a flat plain dissected by the Wabash River and by numerous other rivers, creeks, streams, and ditches (fig. 2). Glaciation was the principal factor affecting the present landforms. The area was completely covered by ice of the Wisconsinan glacial period. As the ice receded to the north, meltwaters flowed across the county and formed terraces and outwash plains along the Wabash River and its tributaries.

The underlying bedrock in the western part of the county is Mississippian age siltstone and shale, and that in the northeastern part of the county is New Albany shale of Devonian age. The bedrock is exposed in many locations along Flint Creek in the western part of the county and along the Wabash River in the northeastern part.

The greatest relief in the county is along the Wabash River and its tributaries, along the breaks between the uplands and the terraces and flood plains. The highest elevation, about 840 feet above sea level, is near Clarks Hill in the southeastern part of the county. The lowest elevation, about 495 feet above sea level, is at the point where the Wabash River leaves the county, at the western edge.

The Wabash River cuts diagonally across the northern half of the county from northeast to southwest.

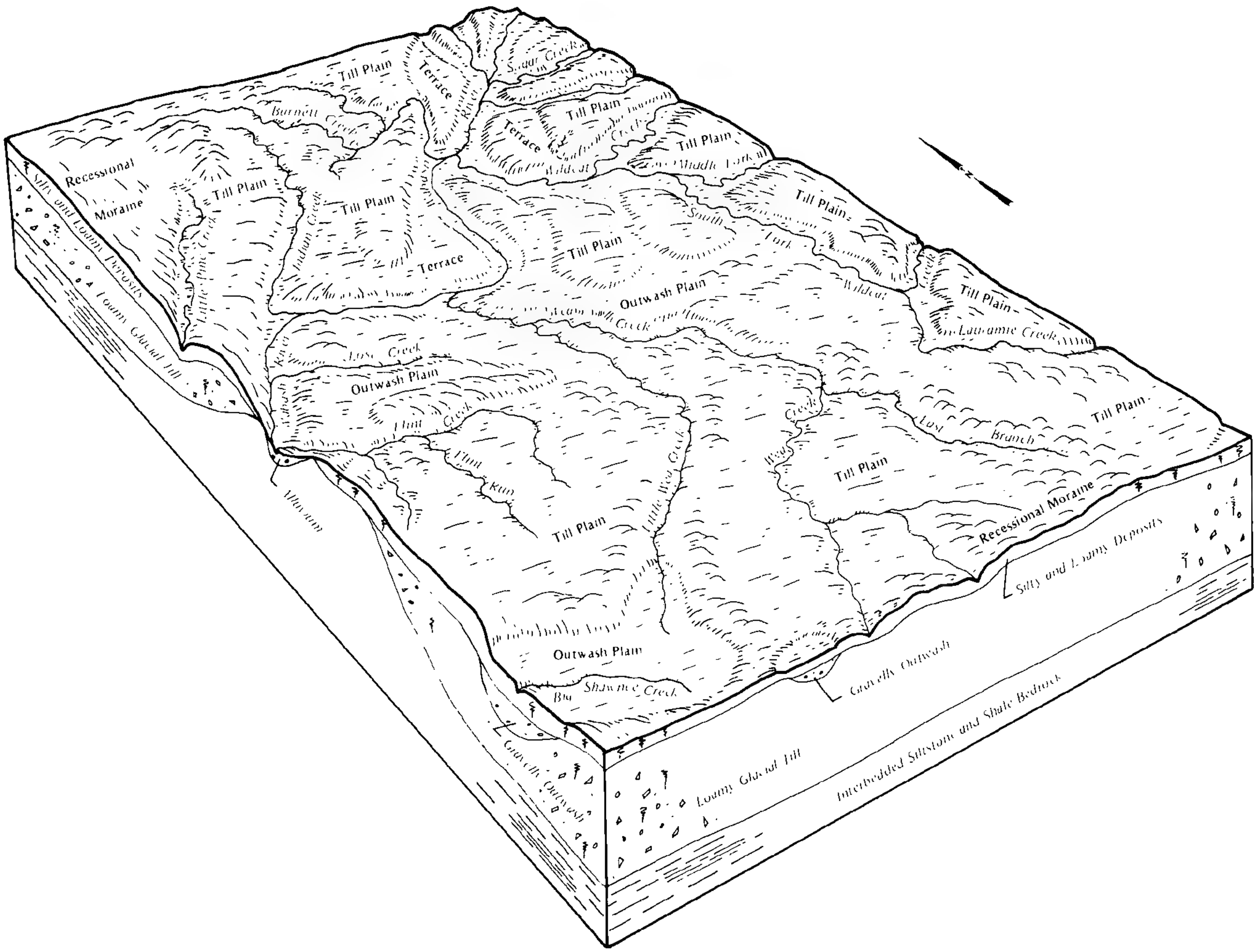

Figure 2.—Physiography and drainage in Tippecanoe County, Indiana.

This river and its tributaries drain all of the county.

The Wabash River is bordered by valleys ranging from ½ mile to 5 miles in width. The valleys associated with its major tributaries range from about 50 feet to ½ mile in width. Bottom-land areas near the mouth of these tributaries are commonly flooded several times in late winter and early spring.

Water Supply

Most of the water for domestic and industrial uses comes from wells. Wells along the Wabash River are in areas of gravelly outwash. These wells serve most of Lafayette, West Lafayette, and numerous industries.

Transportation Facilities and Industries

Interstate 65 and U.S. Highway 52 run diagonally through Tippecanoe County from southeast to northwest. U.S. Highway 231 runs from south to north. Several State highways also cross the county in various directions.

The county has two airports. Two bus lines accommodate travel from the county to various other destinations, and an intra-city public bus line provides service for Lafayette and West Lafayette. Several rail lines cross the county, one of which offers public transportation.

Lafayette and West Lafayette have many industries, and several small industries are in other areas of the

county. Various items are manufactured, including chemicals, automobiles, food-related products, machine and auto parts, and electronic components. Most of the workforce is employed within the county.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Some of the names, descriptions, and delineations of the soils on the soil maps of this survey area do not fully agree with those on the maps of surveys of adjacent counties, which were published at different dates. The differences are the result of changes in series concepts, variations in the intensity of mapping or in the extent of the soils within the survey area, or local decisions regarding ranges used for slope classes.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by two or three kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soil on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map in this publication shows the general soil map units in this survey area. Each map unit has a distinctive pattern of soils, relief, and drainage. Each is a unique natural landscape. Typically, a map unit on a general soil map consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one map unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Soil Descriptions

Very Poorly Drained, Poorly Drained, Somewhat Poorly Drained, and Well Drained, Medium Textured and Moderately Fine Textured, Nearly Level and Gently Sloping Soils; On Glacial Till Plains

These map units are made up mostly of soils that have a seasonal high water table. These soils make up about 58 percent of the county. Most areas are drained and are used for corn, soybeans, or small grain. Some areas are used for hay and pasture or as woodland. The soils are well suited to row crops. They generally have severe limitations affecting sanitary facilities and building site development.

1. Drummer-Toronto-Millbrook

Nearly level, poorly drained and somewhat poorly drained soils that formed in silty material and in the underlying glacial till or glaciofluvial deposits; on till plains

This map unit is in broad depressional areas and slight rises on glacial till plains characterized by swale-and-swell topography and very little relief. Slopes range from 0 to 2 percent.

This map unit makes up about 27 percent of the county. It is about 35 percent Drummer soils, 15 percent Toronto soils, 11 percent Millbrook soils, and 39 percent soils of minor extent (fig. 3).

Drummer soils are poorly drained and are in depressional areas. Some of the Drummer soils have a stratified sandy substratum. Typically, the surface layer of the Drummer soils that do not have a stratified sandy substratum is black silty clay loam. The subsoil is black, grayish brown, light brownish gray, and yellowish brown, mottled silty clay loam, silt loam, and clay loam. Typically, the surface layer of the Drummer soils that have a stratified sandy substratum is black silty clay loam. The subsoil is dark gray and olive gray, mottled silty clay loam and sandy loam.

Toronto soils are somewhat poorly drained and are on slight rises. Typically, they have a surface layer of very dark grayish brown silt loam and a subsoil of dark brown, dark yellowish brown, and yellowish brown, mottled silt loam, silty clay loam, silty clay, clay loam, and loam.

Millbrook soils are somewhat poorly drained and are on slight rises. Typically, they have a surface layer of very dark grayish brown silt loam and a subsoil of light olive brown and yellowish brown, mottled silty clay loam, loam, loamy sand, and sandy loam.

Of minor extent are the moderately well drained Throckmorton soils on rises and gentle breaks along drainageways; the well drained Octagon, Lauramie, Longlois, and Mellott soils on knobs and breaks along drainageways; the very poorly drained Peotone soils in potholes; and the very poorly drained Sloan soils on flood plains.

A drainage system has been installed in most areas of this unit. Most areas are used for corn, soybeans, or small grain. Some areas are used for pasture or hay. A few areas are used for timber production. The soils are well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Wetness and ponding are the main limitations.

The use of these soils for building site development is severely limited by ponding, wetness, restricted

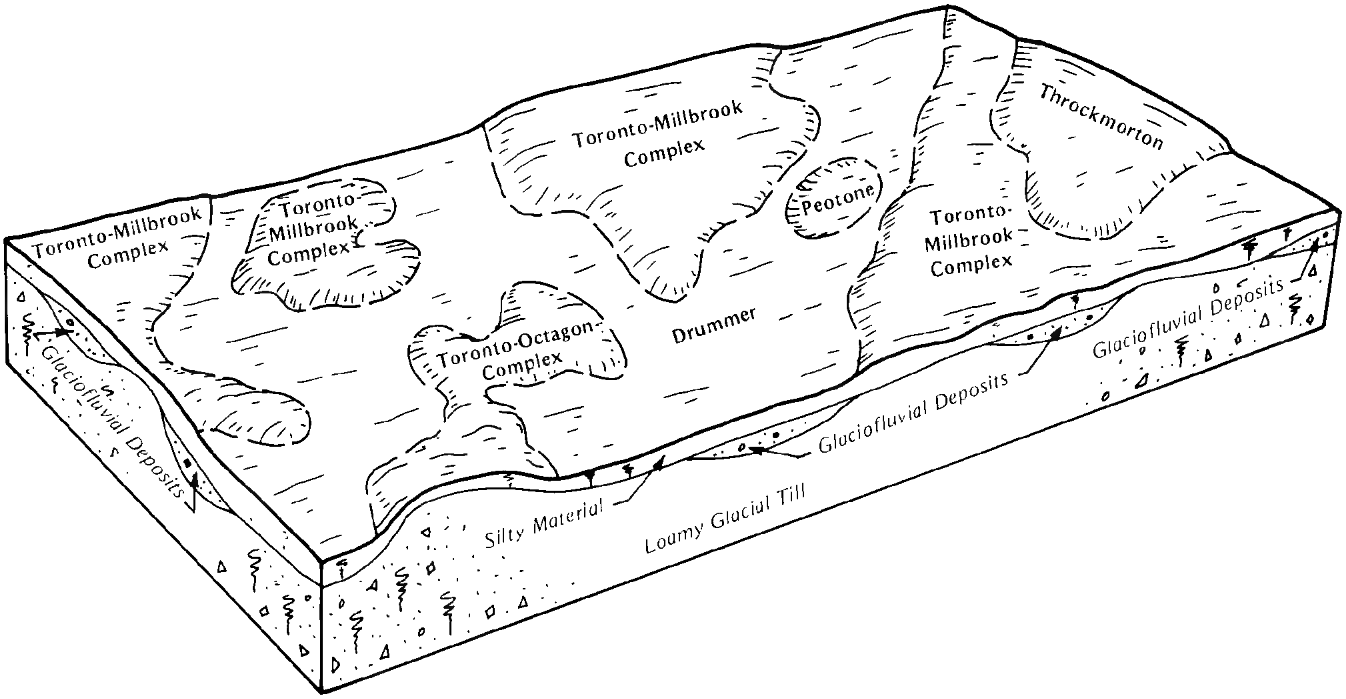

Figure 3.—Typical pattern of soils and parent material in the Drummer-Toronto-Millbrook general soil map unit.

permeability, low strength, and the potential for frost action.

2. Starks-Fincastle

Nearly level, somewhat poorly drained soils that formed in silty material and in the underlying glacial till or glaciofluvial deposits; on till plains

This map unit is on slight rises on glacial till plains characterized by many depressional areas and very little relief. Slopes range from 0 to 2 percent.

This map unit makes up about 21 percent of the county. It is about 27 percent Starks soils, 19 percent Fincastle soils, and 54 percent soils of minor extent.

Typically, the surface layer of the Starks soils is brown silt loam. The subsoil is brown and yellowish brown, mottled silty clay loam, silt loam, and loam.

Typically, the surface layer of the Fincastle soils is dark grayish brown silt loam. The subsoil is olive brown, dark yellowish brown, and yellowish brown, mottled silt loam, silty clay loam, clay loam, and loam.

Of minor extent are the well drained Miami and Richardville soils on knobs and breaks along drainageways; the moderately well drained Rockfield soils on rises and gentle breaks along drainageways; the somewhat poorly drained Crosby soils on rises and breaks along drainageways; and the very poorly drained Mahalasville, Treaty, Milford, and Pella soils in depressions and potholes.

A drainage system has been installed in most areas of this unit. Most areas are used for corn, soybeans, or small grain. Some areas are used for pasture, hay, or woodland. These soils are well suited to corn, soybeans, and small grain and to grasses and legumes for hay or pasture. The major soils are well suited to trees. Wetness is the main limitation.

The use of these soils for building site development is severely limited by the wetness, low strength, and the potential for frost action.

3. Drummer-Raub-Brenton

Nearly level, poorly drained and somewhat poorly drained soils that formed in silty material and in the underlying glacial till or glaciofluvial deposits; on till plains

This map unit consists of soils in broad depressional areas and slight rises on glacial till plains. It is characterized by swale-and-swell topography and very little relief. Slopes range from 0 to 2 percent.

This map unit makes up about 6 percent of the county. It is about 45 percent Drummer soils, 15 percent Raub soils, 11 percent Brenton soils, and 29 percent soils of minor extent.

Drummer soils are poorly drained and are in

depressional areas. Some of the Drummer soils have a stratified sandy substratum. Typically, the surface layer of the Drummer soils that do not have a stratified sandy substratum is black silty clay loam. The subsoil is black, grayish brown, light brownish gray, and yellowish brown, mottled silty clay loam, silt loam, and clay loam. Typically, the surface layer of the Drummer soils that have a stratified sandy substratum is black silty clay loam. The subsoil is dark gray and olive gray, mottled silty clay loam and sandy loam.

Raub soils are somewhat poorly drained and are on slight rises. Typically, they have a surface layer of very dark grayish brown silt loam and a subsoil of light olive brown and grayish brown, mottled silty clay loam, silt loam, clay loam, and loam.

Brenton soils are somewhat poorly drained and are on slight rises. Typically, they have a surface layer of very dark grayish brown silt loam and a subsoil of olive brown and light olive brown, mottled silty clay loam, silt loam, sand, and sandy loam.

Of minor extent are the well drained Tecumseh soils on knobs and breaks along drainageways, the moderately well drained Throckmorton soils on rises and gentle breaks along drainageways, and the very poorly drained Milford and Pella soils in potholes.

A drainage system has been installed in most areas of this unit. Most areas are used for corn, soybeans, or small grain. Some areas are used for hay or pasture. A few areas are used for timber production. These soils are well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Wetness and ponding are the main limitations.

The use of these soils for building site development is severely limited by the ponding, the wetness, low strength, and the potential for frost action.

4. Crosby-Mahalasville-Treaty

Nearly level, somewhat poorly drained and very poorly drained soils that formed in silty material and in the underlying glacial till or glaciofluvial deposits; on till plains

This map unit consists of soils on broad rises and in depressional areas on glacial till plains. It is characterized by swale-and-swell topography and very little relief. Slopes range from 0 to 2 percent.

This map unit makes up about 2 percent of the county. It is about 68 percent Crosby soils, 8 percent Mahalasville soils, 7 percent Treaty soils, and 17 percent soils of minor extent.

Crosby soils are somewhat poorly drained and are on slight rises. Typically, they have a surface layer of dark brown silt loam and a subsoil of dark yellowish brown and yellowish brown, mottled clay loam and loam.

Mahalasville soils are very poorly drained and are in depressional areas. Typically, they have a surface layer of black silty clay loam and a subsoil of dark gray and grayish brown, mottled silty clay loam, loam, and silt loam.

Treaty soils are very poorly drained and are in depressional areas. Typically, they have a surface layer of very dark grayish brown silty clay loam and a subsoil of dark gray, dark grayish brown, and grayish brown, mottled silty clay loam, silt loam, and loam.

Of minor extent are the well drained Miami and Strawn soils adjacent to drainageways and on slope breaks between uplands and either terraces or areas of bottom land and the excessively drained Rodman soils adjacent to drainageways and on slope breaks between uplands and either terraces or flood plains.

A drainage system has been installed in most areas of this unit. Most areas are used for corn, soybeans, or small grain. Some areas are used for pasture, hay, or woodland. These soils are well suited to corn, soybeans, and small grain and to grasses and legumes for hay or pasture. They are well suited to trees. Wetness and ponding are the main limitations.

The use of these soils for building site development is severely limited by the ponding, the wetness, low strength, and the potential for frost action.

5. Fincastle-Crosby-Miami

Nearly level and gently sloping, somewhat poorly drained and well drained soils that formed in silty material and in the underlying glacial till; on till plains

This map unit consists of soils on slight rises and along drainageways on glacial till plains. Slopes range from 1 to 6 percent.

This map unit makes up about 2 percent of the county. It is about 34 percent Fincastle soils, 34 percent Crosby soils, 11 percent Miami soils, and 21 percent soils of minor extent.

Fincastle soils are somewhat poorly drained and are on the broader flats and toe slopes. They are nearly level and gently sloping. Typically, they have a surface layer of dark brown silt loam and a subsoil of brown, grayish brown, and light brownish gray, mottled silty clay loam and loam.

Crosby soils are somewhat poorly drained and are on rises and breaks along drainageways. They are nearly level and gently sloping. Typically, they have a surface layer of dark brown silt loam and a subsoil of grayish brown, brown, light olive brown, and yellowish brown, mottled silty clay loam, clay loam, and loam.

Miami soils are well drained and are on knobs and breaks along drainageways. They are gently sloping.

Typically, they have a surface layer of brown silt loam and a subsoil of dark yellowish brown clay loam, loam, and sandy clay loam.

Of minor extent are the well drained Richardville soils on rises and slope breaks adjacent to drainageways and the very poorly drained Mahalasville and Treaty soils in depressional areas.

A drainage system has been installed in most areas of this unit. Most areas are used for corn, soybeans, or small grain. Some areas are used for pasture, hay, or woodland. These soils are well suited to corn, soybeans, and small grain and to grasses and legumes for hay or pasture. They are well suited to trees. Wetness is the main limitation. Erosion is a concern in the sloping areas.

The use of these soils for building site development is moderately or severely limited by the wetness, the shrink-swell potential, low strength, and the potential for frost action.

Very Poorly Drained to Well Drained, Medium Textured and Moderately Fine Textured, Nearly Level to Strongly Sloping Soils; On Glacial Till Plains, Recessional Moraines, and Flood Plains

These map units are made up of soils that have a seasonal high water table or are subject to erosion. These soils make up about 16 percent of the county. Most areas are drained and are used for corn, soybeans, or small grain. Many of the steeper areas are used for hay, pasture, or woodland. The more level areas are well suited to row crops. The limitations affecting building site development range from moderate to severe.

6. Marker-Drummer-Beecher

Nearly level and gently sloping, moderately well drained, poorly drained, and somewhat poorly drained soils that formed in glacial till or silty material and in the underlying glacial till or glaciofluvial deposits; on recessional moraines

This map unit is made up of soils on broad rises and in depressional areas on glacial moraines. It is characterized by ridges that are dissected by many drainageways. Slopes range from 0 to 6 percent.

This map unit makes up about 1 percent of the county. It is about 47 percent Marker soils, 31 percent Drummer soils, 13 percent Beecher soils, and 9 percent soils of minor extent.

Marker soils are moderately well drained and are on knobs and breaks along drainageways. They are gently sloping. Typically, they have a surface layer of very dark grayish brown silt loam and a subsoil of olive brown and light olive brown, mottled clay loam and silt loam.

Drummer soils are poorly drained and are in drainageways and depressional areas. They are nearly level. Some of the Drummer soils have a stratified sandy substratum. Typically, the surface layer of the Drummer soils that do not have a stratified sandy substratum is black silty clay loam. The subsoil is black, grayish brown, light brownish gray, and yellowish brown, mottled silty clay loam, silt loam, and clay loam. Typically, the surface layer of the Drummer soils that have a stratified sandy substratum is black silty clay loam. The subsoil is dark gray and olive gray, mottled silty clay loam and sandy loam.

Beecher soils are somewhat poorly drained and are on broad flat ridgetops and toe slopes. They are nearly level. Typically, they have a surface layer of very dark grayish brown silt loam and a subsoil of olive brown and light olive brown, mottled silty clay loam.

Of minor extent are the well drained Miami and Octagon soils on knobs and breaks along drainageways and the somewhat poorly drained Toronto and Millbrook soils on toe slopes and at the lower elevations.

A drainage system has been installed in most areas of this unit. Most areas are used for corn, soybeans, or small grain. Some areas are used for pasture or hay. A few areas are used for timber production. These soils are well suited to corn, soybeans, and small grain and to grasses and legumes for hay or pasture. Wetness is the main limitation. Erosion is a hazard in areas of the Marker soils.

The use of the soils in this unit for building site development is moderately or severely limited by ponding, the wetness, low strength, and the potential for frost action.

7. Miami-Crosby-Richardville

Gently sloping to strongly sloping, well drained and somewhat poorly drained soils that formed in silty material and in the underlying glacial till or glaciofluvial deposits; on till plains and recessional moraines

This map unit consists of soils in rolling areas on till plains and moraines that are dissected by many drainageways and small streams. Some areas along the larger streams are characterized by steep, short breaks. Slopes range from 2 to 18 percent.

This map unit makes up about 11 percent of the county. It is about 24 percent Miami soils, 21 percent Crosby soils, 14 percent Richardville soils, and 41 percent soils of minor extent.

Miami soils are well drained and are on knobs and breaks along drainageways. They are gently sloping to

strongly sloping. Typically, they have a surface layer of brown silt loam and a subsoil of dark yellowish brown clay loam, loam, and sandy loam.

Crosby soils are somewhat poorly drained and are on toe slopes and in drainageways. They are gently sloping. Typically, they have a surface layer of brown silt loam and a subsoil of dark yellowish brown and yellowish brown, mottled silty clay loam, clay loam, and loam.

Richardville soils are well drained and are on knobs and breaks along drainageways. They are gently sloping and moderately sloping. Typically, they have a surface layer of dark brown silt loam and a subsoil of dark brown and dark yellowish brown silty clay loam and clay loam.

Of minor extent are the excessively drained Rodman and well drained Strawn soils on steep breaks along streams, the well drained Ockley soils on terraces, and the very poorly drained Sloan and Cohoctah soils on flood plains.

Most areas have been cleared and are used for corn, soybeans, or small grain. The more sloping areas are used for hay, pasture, or woodland. The gently sloping areas are well suited to corn, soybeans, and small grain. The gently sloping and moderately sloping areas are well suited to grasses and legumes for hay or pasture, and the strongly sloping soils are fairly well suited. The soils in this unit are well suited to trees. A drainage system is needed for optimum production in areas of the Crosby soils. Erosion is a concern throughout this unit.

The use of these soils for building site development is moderately or severely limited by the shrink-swell potential, the wetness, low strength, the slope, and the potential for frost action.

8. Octagon-Drummer-Lauramie-Throckmorton

Nearly level to moderately sloping, well drained, poorly drained, and moderately well drained soils that formed in silty material and in the underlying glacial till or glaciofluvial deposits; on till plains and recessional moraines

This map unit is made up of soils in rolling areas on till plains and moraines that are dissected by many drainageways and small streams. Steeper slopes are along many of the drainageways. Slopes range from 0 to 12 percent.

This map unit makes up about 1 percent of the county. It is about 37 percent Octagon soils, 28 percent Drummer soils, 13 percent Lauramie soils, 11 percent Throckmorton soils, and 11 percent soils of minor extent.

Octagon soils are well drained and are on knobs and breaks along drainageways. They are gently sloping and moderately sloping. Typically, they have a surface layer of very dark grayish brown silt loam and a subsoil of dark yellowish brown and yellowish brown clay loam and sandy clay loam.

Drummer soils are poorly drained and are in depressional areas. They are nearly level. Some of the Drummer soils have a stratified sandy substratum. Typically, the surface layer of the Drummer soils that do not have a stratified sandy substratum is black silty clay loam. The subsoil is black, grayish brown, light brownish gray, and yellowish brown, mottled silty clay loam, silt loam, and clay loam. Typically, the surface layer of the Drummer soils that have a stratified sandy substratum is black silty clay loam. The subsoil is dark gray and olive gray, mottled silty clay loam and sandy loam.

Lauramie soils are well drained and are on knobs and breaks along drainageways and small streams. They are gently sloping. Typically, they have a surface layer of dark brown silt loam and a subsoil of dark brown and dark yellowish brown silty clay loam, clay loam, and sandy loam.

Throckmorton soils are moderately well drained and are on broad ridgetops and rises. They are nearly level and gently sloping. Typically, they have a surface layer of very dark gray silt loam and a subsoil of dark brown, dark yellowish brown, and yellowish brown, mottled silt loam, silty clay loam, clay loam, sandy loam, and loam.

Of minor extent are the well drained Mellott and Tecumseh soils on broad ridgetops, the somewhat poorly drained Toronto and Millbrook soils in drainageways and on toe slopes, and the very poorly drained Sloan soils on flood plains.

Most areas are used for corn, soybeans, or small grain. The more sloping areas are used for hay or pasture. A few areas are used for timber production. The gently sloping and nearly level areas are well suited to corn, soybeans, and small grain, and the moderately sloping areas are fairly well suited. The soils in this unit are well suited to grasses and legumes for hay or pasture. Erosion is a concern in the sloping areas. Ponding and wetness are concerns in areas of the Drummer soils.

The use of these soils for building site development is moderately or severely limited by the shrink-swell potential, low strength, the ponding, the slope, and the potential for frost action.

9. Camden-Richardville-Starks-Fincastle

Nearly level to moderately sloping, well drained and somewhat poorly drained soils that formed in silty

material and in the underlying glacial till or glaciofluvial deposits; on till plains

This map unit consists of soils in rolling areas bordering stream valleys and outwash plains. Some areas along the larger streams are characterized by steep, short breaks. Slopes range from 0 to 12 percent.

This map unit makes up about 1 percent of the county. It is about 24 percent Camden soils, 15 percent Richardville soils, 12 percent Starks soils, 9 percent Fincastle soils, and 40 percent soils of minor extent.

Camden soils are well drained and are either on flat ridgetops between drainageways or adjacent to streams. They are nearly level. Typically, they have a surface layer of dark brown silt loam and a subsoil of dark yellowish brown and dark brown silt loam, silty clay loam, loam, and sandy loam.

Richardville soils are well drained and are on knobs and breaks along drainageways and small streams. They are nearly level to moderately sloping. Typically, they have a surface layer of dark brown silt loam and a subsoil of dark brown and dark yellowish brown silty clay loam and clay loam.

Starks soils are somewhat poorly drained and are in drainageways and on toe slopes. They are nearly level. Typically, they have a surface layer of brown silt loam and a subsoil of brown and yellowish brown, mottled silty clay loam, silt loam, and loam.

Fincastle soils are somewhat poorly drained and are in drainageways and on toe slopes. Typically, they have a surface layer of dark grayish brown silt loam and a subsoil of olive brown, dark yellowish brown, and yellowish brown, mottled silt loam, silty clay loam, clay loam, and loam.

Of minor extent are the very poorly drained Mahalasville, Treaty, and Milford soils in depressional areas and potholes; the well drained Miami and Strawn soils on the steeper breaks along drainageways and streams; and the excessively drained Rodman soils on steep breaks along streams.

Most areas have been cleared and are used for corn, soybeans, or small grain. Some areas are used for pasture, hay, or woodland. The nearly level and gently sloping areas are well suited to corn, soybeans, and small grain and to grasses and legumes for hay or pasture. This unit is well suited to trees. A drainage system is needed in areas of the Starks and Fincastle soils for optimum production. Erosion is a concern in the more sloping areas.

The use of these soils for building site development is moderately or severely limited by the wetness, the slope, low strength, and the potential for frost action.

10. Lauramie-Tecumseh-Linkville, Loamy Substratum

Nearly level and gently sloping, well drained soils that formed in silty material or glaciofluvial deposits and in the underlying glacial till; on till plains and recessional moraines

This map unit consists of soils in rolling areas on glacial till plains and moraines bordering outwash plains. Some areas along the larger streams are characterized by short, steep breaks. Slopes range from 0 to 6 percent.

This map unit makes up about 1 percent of the county. It is about 23 percent Lauramie soils, 18 percent Tecumseh soils, 15 percent Linkville soils, and 44 percent soils of minor extent.

Lauramie soils are on knobs and breaks along drainageways and streams. They are nearly level and gently sloping. Typically, they have a surface layer of dark brown silt loam and a subsoil of dark brown and dark yellowish brown silty clay loam, clay loam, and sandy loam.

Tecumseh soils are on broad flats. They are nearly level. Typically, they have a surface layer of very dark grayish brown silt loam and a subsoil of dark brown, dark yellowish brown, and yellowish brown silt loam, silty clay loam, clay loam, sandy loam, and loam.

Linkville soils have a loamy substratum. They are on toe slopes, ridgetops, and side slopes. They are nearly level and gently sloping. Typically, they have a surface layer of very dark gray loam and a subsoil of dark brown, brown, and dark yellowish brown loam and clay loam.

Of minor extent are the poorly drained Drummer soils in depressional areas and drainageways; the somewhat poorly drained La Hogue, Toronto, and Millbrook soils at the lower elevations and on toe slopes; the moderately well drained Throckmorton soils on toe slopes and in drainageways; the well drained Octagon and Strawn soils and the excessively drained Rodman soils on the steeper breaks along drainageways and streams; and the excessively drained Sparta soils on the ridges of sand dunes.

Most areas are used for corn, soybeans, or small grain. Some areas are used for pasture or hay. A few areas are used for timber production. These soils are well suited to corn, soybeans, and small grain and to grasses and legumes for hay or pasture. Erosion is a concern in the sloping areas.

The use of these soils for building site development is moderately or severely limited by the shrink-swell potential, low strength, and the potential for frost action.

11. Rainsville-Sloan-Miami-Rockfield

Nearly level to strongly sloping, moderately well drained, very poorly drained, and well drained soils that formed in silty material and in the underlying glaciofluvial deposits and glacial till or alluvium; on till plains, recessional moraines, and flood plains

This map unit consists of soils in rolling areas on till plains, moraines, and flood plains. It is dissected by many drainageways and has many depressional areas. Slopes range from 0 to 18 percent.

This map unit makes up about 1 percent of the county. It is about 22 percent Rainsville soils, 18 percent Sloan soils, 16 percent Miami soils, 12 percent Rockfield soils, and 32 percent soils of minor extent.

Rainsville soils are moderately well drained and are on knobs and breaks along drainageways. They are gently sloping. Typically, they have a surface layer of brown silt loam and a subsoil of dark yellowish brown, yellowish brown, and light olive brown, mottled silty clay loam, clay loam, sandy loam, and loam.

Sloan soils are very poorly drained and are on flood plains. They are nearly level. Typically, they have a surface layer of black clay loam and a subsoil of grayish brown, mottled loam that has strata of sandy loam.

Miami soils are well drained and are on knobs and breaks along drainageways and small streams. They are gently sloping to strongly sloping. Typically, they have a surface layer of brown silt loam and a subsoil of dark yellowish brown and yellowish brown silty clay loam, clay loam, and loam.

Rockfield soils are moderately well drained and are on ridgetops and gentle breaks along drainageways. They are nearly level and gently sloping. Typically, they have a surface layer of dark brown silt loam and a subsoil of dark yellowish brown and light olive brown, mottled silty clay loam, clay loam, and loam.

Of minor extent are the well drained Richardville soils on knobs and breaks along drainageways, the well drained Strawn and excessively drained Rodman soils on steep breaks adjacent to flood plains, the somewhat poorly drained Starks and Fincastle soils on flat ridgetops and in low areas, and the very poorly drained Mahalasville and Treaty soils in depressional areas.

Most areas have been cleared and are used for corn, soybeans, or small grain. Generally, the more sloping areas are used for hay, pasture, or woodland. The nearly level and gently sloping areas are well suited to corn, soybeans, and small grain. The nearly level to moderately sloping areas are well suited to grasses and legumes for hay and pasture, and the strongly sloping soils are fairly well suited. This unit is well suited to trees. A drainage system is needed in areas of the Sloan soils for optimum yields. Erosion is a hazard in the more sloping areas. Flooding is a hazard in areas of the Sloan soils.

The use of the soils in this unit for building site development is moderately or severely limited by the shrink-swell potential, the slope, the wetness, low strength, and the potential for frost action. The ponding and the flooding are severe limitations in areas of the Sloan soils.

Well Drained, Somewhat Poorly Drained, and Very Poorly Drained, Moderately Fine Textured to Moderately Coarse Textured, Nearly Level to Strongly Sloping Soils; On Terraces, Outwash Plains, and Kames

These map units are made up of soils underlain by sand and gravel. These soils make up about 16 percent of the county. Most areas are used for corn, soybeans, or small grain. Many of the steeper areas are used for hay, pasture, or woodland. The more level areas are well suited to row crops. The limitations affecting building site development range from slight to severe.

12. Elston, Gravelly Substratum-Carmi

Nearly level and gently sloping, well drained soils that formed in loamy outwash and in the underlying gravelly outwash deposits; on terraces and outwash plains

This map unit consists of soils on flats and along elevation breaks on terraces and broad outwash plains adjacent to the Wabash River. Slopes range from 0 to 6 percent.

This map unit makes up about 7 percent of the county. It is about 44 percent Elston soils, 16 percent Carmi soils, and 40 percent soils of minor extent (fig. 4).

The Elston soils in this map unit have a gravelly substratum. They are on terraces and broad flats on outwash plains. They are nearly level. Typically, they have a surface layer of very dark brown loam and a subsoil of dark yellowish brown and dark brown loam, sandy loam, and loamy sand.

Carmi soils are on terraces and outwash plains. They are nearly level and gently sloping. Typically, they have a surface layer of very dark gray loam and a subsoil of dark brown loam, gravelly loam, gravelly sandy loam, and gravelly loamy sand.

Of minor extent are the well drained Troxel soils in depressional areas, the well drained Desker soils on the steeper terrace breaks, the excessively drained Rodman soils on steep terrace breaks, the excessively drained Sparta soils on gently sloping and moderately sloping sand dunes, and the well drained Battleground and Allison soils on flood plains.

Most areas are used for corn, soybeans, or small

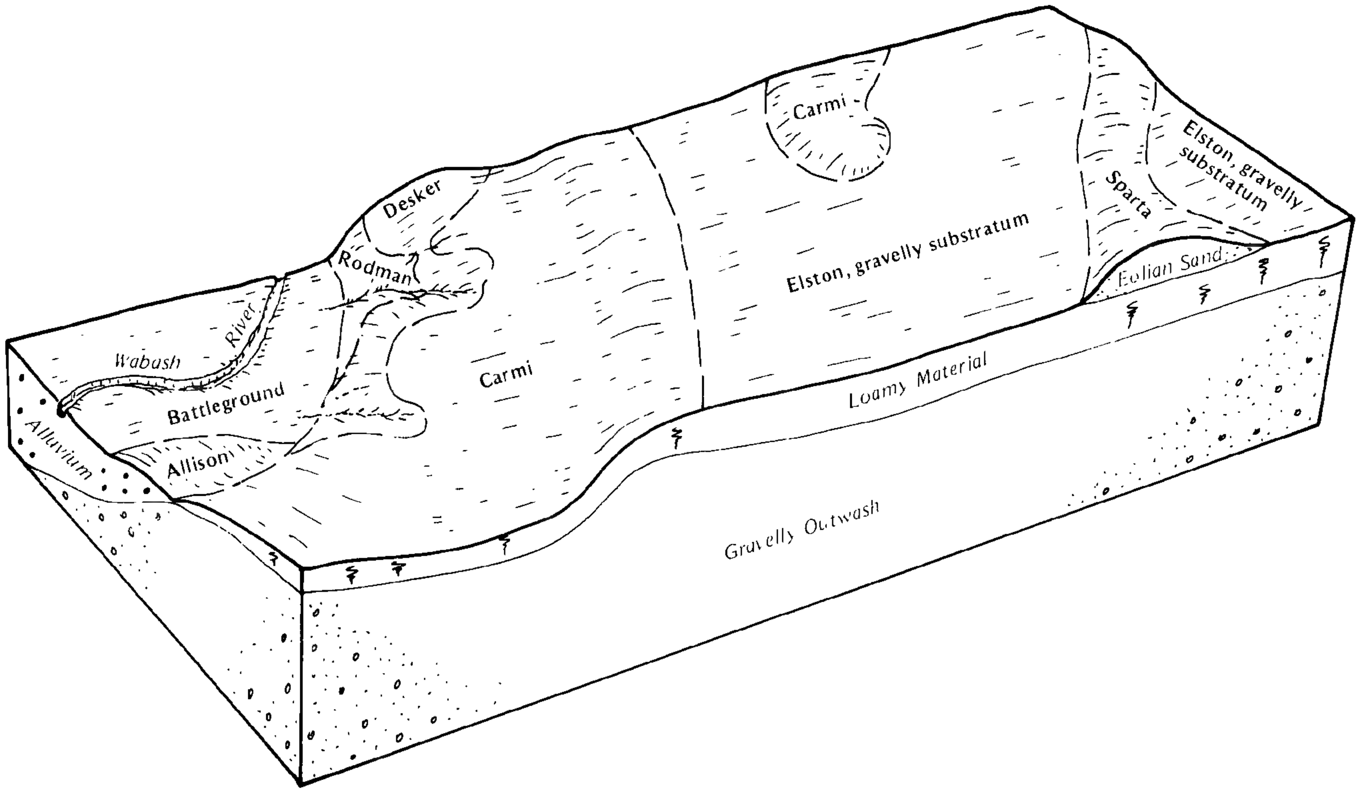

Figure 4.—Typical pattern of soils and parent material in the Elston, gravelly substratum-Carmi general soil map unit.

grain. Some areas are used for pasture or hay. A few areas are used for timber production. The Elston soils are fairly well suited to corn, soybeans, and small grain, and the Carmi soils are well suited. The soils in this unit are well suited to grasses and legumes for hay or pasture. Droughtiness is a limitation, and soil blowing is a hazard. Erosion is a concern in the gently sloping areas of the Carmi soils.

The potential for frost action is a moderate limitation if these soils are used for building site development.

13. Mahalasville, Gravelly Substratum-Waupecan-Lafayette

Nearly level, very poorly drained, well drained, and somewhat poorly drained soils that formed in silty material and in the underlying loamy and gravelly outwash deposits; on outwash plains

This map unit consists of soils in broad depressional areas and on rises on outwash plains. It is characterized by swale-and-swell topography. A drainage system has been installed in most areas. Slopes range from 0 to 2 percent.

This map unit makes up about 5 percent of the county. It is about 38 percent Mahalasville soils, 24 percent Waupecan soils, 10 percent Lafayette soils, and 28 percent soils of minor extent.

The Mahalasville soils in this map unit have a gravelly substratum. They are very poorly drained and are in depressional areas. Typically, they have a surface layer of black silty clay loam and a subsoil of very dark gray, dark gray, grayish brown, and dark olive gray, mottled silty clay loam, clay loam, and sandy clay loam.

Waupecan soils are well drained and are in broad flat areas on low rises. Typically, they have a surface layer of very dark gray silt loam and a subsoil of dark brown and dark yellowish brown silt loam, silty clay loam, sandy loam, and loamy sand.

Lafayette soils are somewhat poorly drained and are on low rises and in broad, low areas. Typically, they have a surface layer of very dark gray silt loam and a subsoil of brown, dark yellowish brown, yellowish brown, grayish brown, and dark grayish brown, mottled silt loam, silty clay loam, sandy loam, loamy coarse sand, and gravelly sandy loam.

Of minor extent are the well drained Bowes soils, the

moderately well drained Bowes Variant soils, and the somewhat poorly drained Mulvey and Waynetown soils on low rises.

Most areas are used for corn, soybeans, or small grain. Some areas are used for pasture or hay. A few areas are used for timber production. These soils are well suited to corn, soybeans, and small grain and to grasses and legumes for hay or pasture. A drainage system is needed in areas of the Mahalasville and Lafayette soils for optimum production.

The use of these soils for building site development is moderately or severely limited by the ponding, the wetness, the shrink-swell potential, low strength, and the potential for frost action.

14. Longlois, Kame-Desker, Kame

Gently sloping to strongly sloping, well drained soils that formed either in silty material and the underlying loamy and gravelly outwash or in gravelly outwash; on kames

This map unit consists of soils on kames. It is characterized by a series of elongated ridges that are typically higher than the surrounding landscape. Slopes range from 2 to 18 percent.

This map unit makes up about 1 percent of the county. It is about 34 percent Longlois soils, 25 percent Desker soils, and 41 percent soils of minor extent.

Longlois soils are in gently sloping areas on kames. Typically, they have a surface layer of dark brown silt loam and a subsoil of dark yellowish brown and dark brown silty clay loam, clay loam, sandy clay loam, and sandy loam.

Desker soils are in moderately sloping to strongly sloping areas on kames. Typically, they have a surface layer of very dark grayish brown sandy loam and a subsoil of dark brown and dark yellowish brown sandy loam, coarse sandy loam, and gravelly loamy sand.

Of minor extent are the excessively drained Rodman soils on knobs and steep side slopes; the well drained Camden, Mellott, Bowes, and Waupecan soils on toe slopes and flat ridgetops; the well drained Troxel soils in depressions; and the somewhat poorly drained Toronto and Millbrook soils on toe slopes and in low areas.

Most areas are used for corn, soybeans, or small grain. Some areas are used for hay, pasture, or woodland. The less sloping areas are well suited to corn, soybeans, and small grain. The soils in this unit are well suited to grasses and legumes for hay and pasture. Droughtiness and the hazard of erosion are the main management concerns.

The use of these soils for building site development is moderately or severely limited by the shrink-swell potential, the potential for frost action, low strength, and the slope.

15. Billett, Gravelly Substratum-Kalamazoo

Nearly level and gently sloping, well drained soils that formed in loamy outwash and in the underlying gravelly outwash deposits; on terraces and outwash plains

This map unit consists of soils on flats and along elevation breaks on terraces and broad outwash plains adjacent to the Wabash River. Slopes range from 0 to 6 percent.

This map unit makes up about 3 percent of the county. It is about 54 percent Billett soils, 40 percent Kalamazoo soils, and 6 percent soils of minor extent.

The Billett soils in this map unit have a gravelly substratum. They are on broad flats, terrace breaks, and breaks along drainageways. Typically, they have a surface layer of brown loam and a subsoil of brown and dark brown loam, sandy clay loam, and loamy coarse sand.

Kalamazoo soils are on broad flats, terrace breaks, and breaks along drainageways. Typically, they have a surface layer of brown loam and a subsoil of brown and dark brown loam, sandy clay loam, and loamy coarse sand.

Of minor extent are the excessively drained Rodman and well drained Strawn soils on steep breaks and the well drained Kosciusko soils on the more sloping terraces and breaks along outwash plains.

Most areas are used for corn, soybeans, or small grain. Some areas are used for hay, pasture, or woodland. These soils are well suited to corn, soybeans, and small grain and to grasses and legumes for hay or pasture. They are well suited to trees. Erosion is the main hazard in the sloping areas. Soil blowing is a concern in areas of the Billett soils.

The potential for frost action is a moderate limitation if these soils are used for building site development.

Well Drained and Excessively Drained, Medium Textured and Moderately Coarse Textured, Moderately Steep to Very Steep Soils; On Till Plains, Terraces, and Outwash Plains

These map units are made up mostly of shallow soils that have slopes of more than 18 percent. These soils make up about 2 percent of the county. Most areas are used as woodland. Some areas are used for hay or pasture. The soils are generally unsuited to row crops. The limitations affecting building site development are severe.

16. Strawn-Rodman

Moderately steep to very steep, well drained and excessively drained soils that formed in glacial till or gravelly outwash; on till plains, outwash plains, and terraces

This map unit consists of soils on steep breaks between flood plains and uplands or terraces and on steep-sided drainageways along streams. It is generally characterized by steep valleys and narrow flood plains, mostly less than ⅛ mile wide. Slopes range from 18 to 60 percent.

This map unit makes up about 2 percent of the county. It is about 31 percent Strawn soils, 23 percent Rodman soils, and 46 percent soils of minor extent (fig. 5).

Strawn soils are well drained and are on the upper part of steep glacial till plain breaks and drainageways. Typically, they have a surface layer of very dark grayish brown silt loam and a subsoil of dark yellowish brown loam.

Rodman soils are excessively drained and are on the lower part of steep glacial till plain breaks and drainageways. Typically, they have a surface layer of very dark gravelly sandy loam and a subsoil of dark brown gravelly loamy coarse sand.

Of minor extent are the well drained Miami and Richardville soils on the less sloping upper part of side slopes and ridgetops; the well drained Ockley and Kalamazoo soils on the less sloping terrace ridgetops and side slopes; and the somewhat excessively drained Ouiatenon soils on narrow flood plains.

Most areas are used as woodland. Some of the less sloping areas and areas on flood plains are used for corn, soybeans, or small grain or for hay and pasture. These soils are generally unsuited to corn, soybeans, and small grain and to grasses and legumes for hay or pasture. They are poorly suited to trees. The slope and the hazard of erosion are the main management concerns.

The slope is a severe limitation if these soils are used for building site development.

Excessively Drained, Somewhat Excessively Drained, Well Drained, Somewhat Poorly Drained, and Very Poorly Drained, Medium Textured to Coarse Textured, Nearly Level Soils; On Flood Plains and Low Terraces

These map units consist of soils that border streams and rivers. Most areas are subject to flooding. These soils make up about 8 percent of the county. Most areas are used for corn or soybeans. Some areas are used for hay, pasture, or woodland. The soils generally are well suited to cultivated crops. The limitations affecting building site development are severe.

17. Battleground-Allison-Lash

Nearly level, well drained soils that formed in alluvial deposits; on flood plains

This map unit consists of soils on broad flood plains along the Wabash River. Slopes range from 0 to 2 percent.

This map unit makes up about 4 percent of the county. It is about 37 percent Battleground soils, 10 percent Allison soils, 9 percent Lash soils, and 44 percent soils of minor extent.

Battleground soils are generally in large areas adjacent to the river channel. Typically, they have a surface layer of very dark grayish brown silt loam and a subsoil of dark brown silty clay loam.

Allison soils are generally in the slightly higher areas adjacent to terraces and uplands. Typically, they have a surface layer of very dark grayish brown silt loam and a subsoil of dark brown silty clay loam.

Lash soils are generally in the slightly higher areas on flood plains. Typically, they have a surface layer of very dark grayish brown silt loam and a subsoil of dark brown silt loam and loam.

Of minor extent are the very poorly drained Sawabash and somewhat poorly drained Tice soils in depressional areas; the well drained Du Page, Wea, Ross, and Pinevillage soils in the higher areas on flood plains; the somewhat excessively drained Ouiatenon soils that have a sandy substratum on rises and in areas adjacent to the river channel; and the well drained Strawn and excessively drained Rodman soils on steep breaks between flood plains and the uplands or terraces.

Most areas are used for corn or soybeans. A few areas are used for pasture, hay, or woodland. These soils are well suited to corn and soybeans and to grasses and legumes for hay or pasture. They are poorly suited to small grain because of the flooding. They are well suited to trees. The flooding is the major management concern.

These soils are generally unsuited to building site development because of the flooding, low strength, and the potential for frost action.

18. Ouiatenon-Ceresco, Gravelly Substratum-Cohoctah, Gravelly Substratum-Hononegah

Nearly level, somewhat excessively drained, somewhat poorly drained, very poorly drained, and excessively drained soils that formed in alluvial deposits or outwash deposits; on flood plains and stream terraces

This map unit consists of soils on flood plains and low terraces along the smaller streams and rivers that

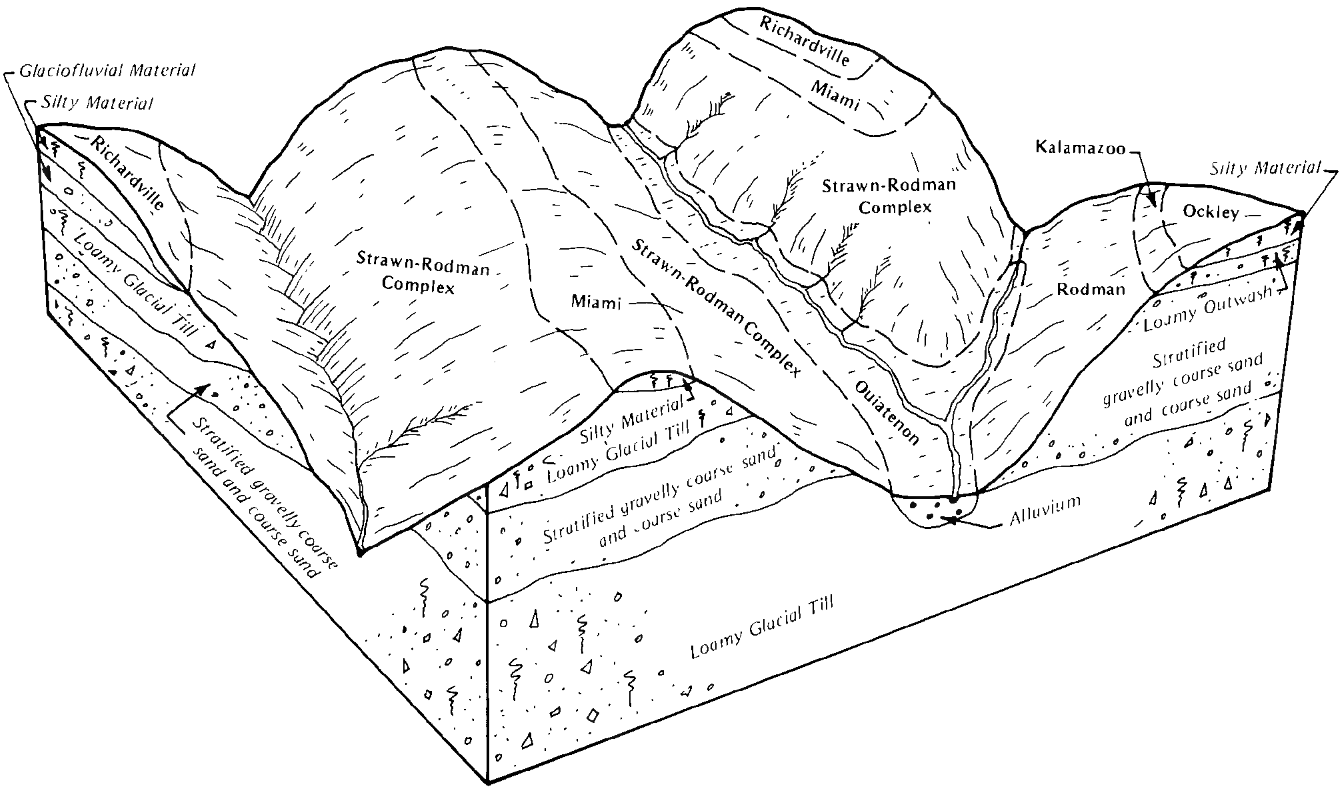

Figure 5.—Typical pattern of soils and parent material in the Strawn-Rodman general soil map unit.

flow into the Wabash River. Slopes range from 0 to 2 percent.

This map unit makes up about 4 percent of the county. It is about 40 percent Ouiatenon soils, 20 percent Ceresco soils, 18 percent Cohoctah soils, 15 percent Hononegah soils, and 7 percent soils of minor extent (fig. 6).

Ouiatenon soils are somewhat excessively drained and are generally in areas adjacent to stream channels. Typically, they have a surface layer of very dark gray loamy sand and dark brown coarse sand and are very gravelly coarse sand in the underlying material.

The Ceresco soils in this unit have a gravelly substratum. They are somewhat poorly drained and are generally in low areas adjacent to uplands and terraces on flood plains. Typically, they have a surface layer of very dark gray loam and a subsoil of dark yellowish brown and dark grayish brown, mottled fine sandy loam.

The Cohoctah soils in this unit have a gravelly substratum. They are very poorly drained and are generally in depressional areas adjacent to uplands and terraces on flood plains. Typically, they have a surface layer of very dark gray fine sandy loam and a subsoil of dark grayish brown and grayish brown, mottled fine sandy loam and loamy fine sand.

Hononegah soils are excessively drained and are on low terraces adjacent to narrow flood plains. Typically, they have a surface layer of very dark grayish brown fine sandy loam and a subsoil of dark yellowish brown and dark brown fine sandy loam, loamy sand, gravelly loamy sand, and gravelly sand.

Of minor extent are the well drained Strawn and excessively drained Rodman soils on steep breaks between flood plains or low terraces and uplands or high terraces; the well drained Pinevillage soils on toe slopes of the steep breaks between flood plains and either terraces or uplands; the very poorly drained Mahalasville soils that have a gravelly substratum in depressional areas on low terraces; and the very poorly drained Saranac soils that have a gravelly substratum in depressional areas on flood plains.

Most areas have been cleared and are used for corn, soybeans, or small grain. A drainage system has been installed in most of these areas. Many areas are used as woodland, and a few areas are used for hay or pasture. The Ouiatenon and Hononegah soils are fairly well suited to cultivated crops. The Ceresco and Cohoctah soils are well suited to cultivated crops.

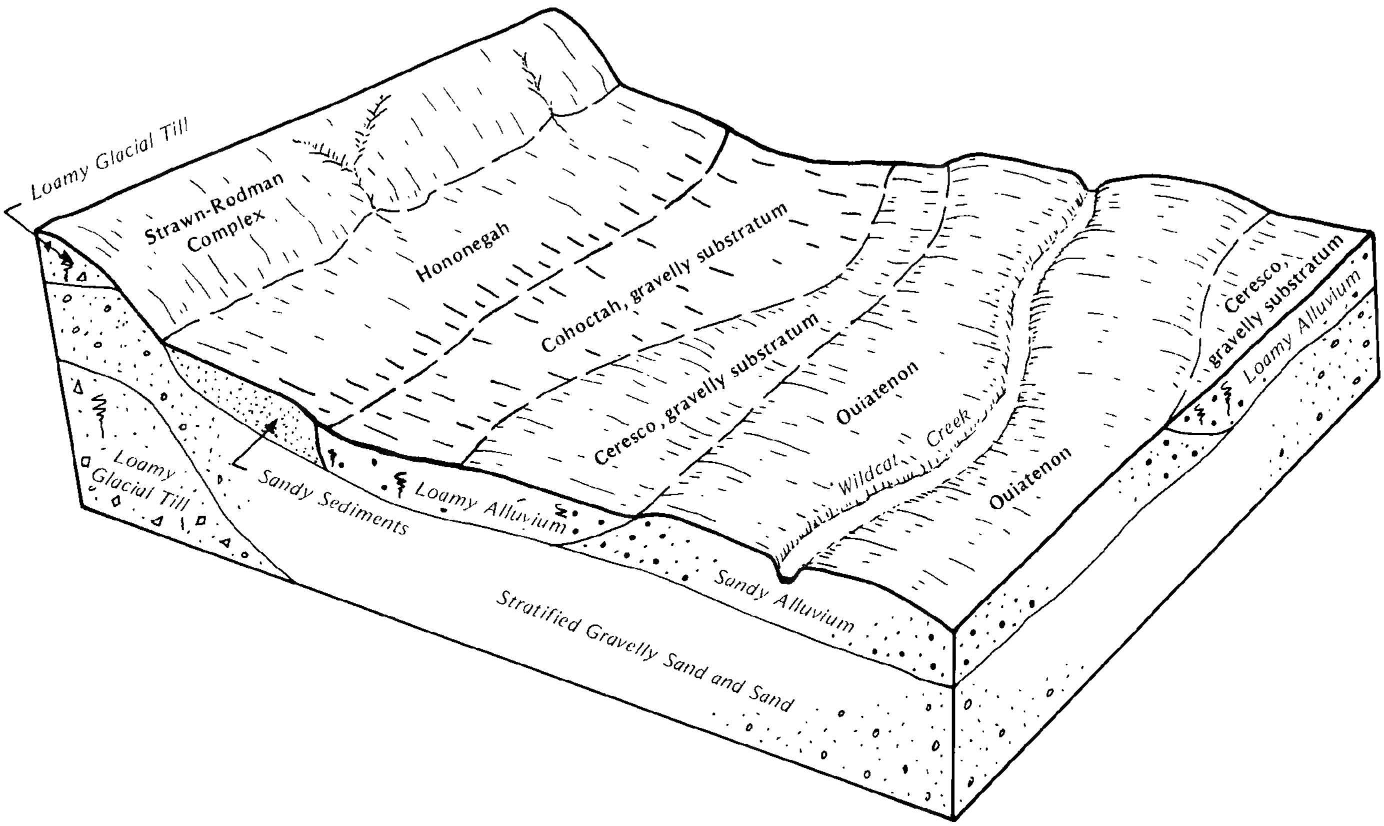

Figure 6.—Typical pattern of soils and parent material in the Ouiatenon-Ceresco, gravelly substratum-Cohoctah, gravelly substratum-Hononegah general soil map unit.

Hononegah soils are poorly suited to cultivated crops. The soils in this unit are well suited to grasses and legumes for hay or pasture, but flooding may destroy stands of small grain. The soils are well suited to trees. Droughtiness is a limitation in areas of the Ouiatenon and Hononegah soils. The flooding, the hazard of soil blowing, and ponding also are management concerns in areas of this unit. The wetness is a concern in areas of the Ceresco and Cohoctah soils.

Generally, the use of these soils for building site development is severely limited by the flooding, the ponding, the wetness, and the potential for frost action. The Hononegah soils are suitable for building site development.

Moderately Well Drained, Somewhat Poorly Drained, and Very Poorly Drained, Moderately Fine Textured and Medium Textured, Nearly Level to Moderately Sloping Soils; On Uplands and Flood Plains

These map units consist of soils underlain by interbedded siltstone and shale bedrock. These soils make up about 1 percent of the county. Most areas are used for corn, soybeans, or small grain. Some areas are used for hay, pasture, or woodland. The less sloping soils are well suited to row crops. The limitations affecting building site development are moderate or severe.

19. High Gap Variant-Sloan Variant-Shadeland

Nearly level to moderately sloping, moderately well drained, very poorly drained, and somewhat poorly drained soils that formed in silty material or glacial drift and in the underlying residuum derived from siltstone and shale bedrock; on uplands and flood plains

This map unit consists of soils on breaks either between flood plains and uplands or between outwash plains and uplands and on flood plains. Some areas adjacent to the flood plains have steep, short breaks that are outcrops of bedrock. Slopes range from 0 to 12 percent.

This map unit makes up less than 1 percent of the county. It is about 34 percent High Gap Variant soils, 27 percent Sloan Variant soils, 22 percent Shadeland soils,

and 17 percent soils of minor extent.

High Gap Variant soils are moderately well drained and are on knobs and breaks along drainageways adjacent to flood plains. They are nearly level to moderately sloping. Typically, they have a surface layer of dark brown silt loam and a subsoil of dark yellowish brown and dark brown, mottled silt loam, clay loam, and channery clay loam.

Sloan Variant soils are very poorly drained and are on broad flood plains underlain by bedrock. They are nearly level. Typically, they have a surface layer of black silty clay loam and a subsoil of very dark gray and dark grayish brown, mottled silty clay loam, very channery sandy clay loam, and extremely channery sandy clay loam.

Shadeland soils are somewhat poorly drained and are on flats and toe slopes and in drainageways. They are nearly level and gently sloping. Typically, they have a surface layer of dark brown silt loam and a subsoil of brown, dark brown, and strong brown, mottled silt loam, silty clay loam, clay loam, and channery clay loam.

Of minor extent are the somewhat excessively drained Ouiatenon and very poorly drained Sawabash soils on the lower flood plains, the well drained Pinevillage soils on the higher flood plains, the well drained Berks soils on steep hillslopes, and the very poorly drained Mahalasville soils that have a shale substratum in depressions and drainageways.

Most areas have been cleared and are used for corn, soybeans, or small grain. A drainage system has been installed in these areas. Some areas are used for hay, pasture, or woodland. The nearly level and gently sloping areas of the High Gap Variant and Shadeland soils are well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. The Sloan Variant soils are fairly well suited to corn and soybeans. The High Gap Variant soils are fairly well suited to trees, the Sloan Variant soils are poorly suited, and the Shadeland soils are well suited. A drainage system is needed for optimum production in areas of the Sloan Variant and Shadeland soils. Flooding is a management concern in areas of the Sloan Variant soils, and erosion is a concern in the more sloping areas.

The use of the soils in this unit for building site development is moderately or severely limited by the wetness, low strength, and the potential for frost action. Flooding and ponding are additional limitations in areas of the Sloan Variant soils.

Broad Land Use Considerations

The potential of the soils in Tippecanoe County for major land uses is variable. Decisions regarding which land should be used for urban development or for agriculture are important issues in the county now and will probably become even more important in the future. The general soil map is helpful in planning the general outline for specific uses, such as urban development, but it cannot be used to select specific sites for buildings. Data on specific soils can be helpful in planning future land use patterns in the county.

An estimated 71 percent of the county, or about 229,000 acres, is used for cultivated crops, mainly corn, soybeans, and small grain. This acreage is throughout the county. Wetness is the major limitation in areas of general soil map units 1, 2, 3, 4, 5, 6, 7, 13, 18, and 19, but most areas of these units have been artificially drained. Erosion is a hazard in areas of the sloping soils in map units 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 16, and 19. Flooding is a concern if cultivated crops are grown in areas of map units 11, 17, 18, and 19.

About 3 percent of the county, or about 9,700 acres, is used for hay or pasture. This acreage is scattered throughout the county but is concentrated in the more sloping areas, such as those in map units 7, 8, and 9. All of the map units, except for map unit 16, are well suited to grasses and legumes for hay or pasture. Flooding is a hazard if grasses and legumes are grown in areas of map units 11, 17, 18, and 19.

An estimated 5 percent of the county, or about 16,500 acres, is woodland. Small woodlots are scattered throughout the county, but they are not extensive because most of the land has been cleared and is used for cultivated crops. Most of the woodland is concentrated in map units 7, 9, 11, 16, and 18. The soils in map units 2, 4, 5, 7, 9, 11, 15, 17, 18, and 19 are mostly well suited to trees.

Each year a considerable amount of land is developed for urban uses around the cities of Lafayette and West Lafayette and in scattered small areas throughout the county. It is estimated that about 7 percent of the county, or about 24,000 acres, is urban or built-up land. Areas where the soils are so unfavorable that the cost of urban development is nearly prohibitive are extensive in the county. Flooding is a hazard, for example, in areas of map units 17 and 18, in areas of the Sloan soils in map unit 11, and in areas of the Sloan Variant soils in map unit 19. These soils are on flood plains. The slope is a severe limitation in areas of map unit 16 that are used for urban development. Most of the soils in map units 1, 2, 3, 4, 5, 6, and 13 have severe limitations affecting urban development. These limitations are the result of ponding, wetness, restricted permeability, low strength, and the potential for frost action. Most of these soils have a seasonal high water table, and extensive surface and subsurface drainage is necessary if they

are to be developed for urban uses. In general, the soils in map units 7, 8, 9, 10, 11, 12, 14, and 15 and the Waupecan soils in map unit 13 have moderate or severe limitations affecting urban development. The shrink-swell potential, low strength, and the potential for frost action are concerns in areas of these soils. The Hononegah soils in map unit 18 are suitable for building site development.

Detailed Soil Map Units

The map units on the detailed soil maps in this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information is given under the heading "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Miami silt loam, 6 to 12 percent slopes, eroded, is a phase of the Miami series.

Some map units are made up of two or more major soils. These map units are called soil complexes. A *soil complex* consists of two or more soils, or one or more soils and a miscellaneous area, in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Toronto-Millbrook complex, 0 to 2 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits, gravel, is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

Soil Descriptions

Am—Allison silt loam, protected. This nearly level, very deep, well drained soil is on flood plains. It is protected from flooding by levees and pumps. Individual areas are irregular in shape and range from 3 to 150 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 10 inches thick. The subsurface layer is very dark grayish brown, friable silt loam and firm silty clay loam about 7 inches thick. The subsoil to a depth of 80 inches or more is firm silty clay loam. It is very dark grayish brown in the upper part and brown in the lower part. In some places the dark surface layer is less than 24 inches thick. In other places free carbonates are throughout the subsoil.

Included with this soil in mapping are the well drained Ross, somewhat poorly drained Tice, and very poorly drained Sawabash soils. Ross soils have more sand in the upper part of the subsoil than the Allison soil. They are in the higher lying areas. Tice and Sawabash soils are in the lower lying areas. Included soils make up about 10 percent of the unit.

The available water capacity is very high in the Allison soil. Permeability is moderate. Surface runoff is

slow. The content of organic matter in the surface layer is moderate.

Most areas of this soil are used for cultivated crops.

This soil is well suited to corn, soybeans, and small grain. Crusting is a management concern. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to spring moldboard, chisel, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

Because of possible flooding as a result of levee failure, this soil is generally unsuitable as a site for dwellings. Because of low strength and the potential for frost action, the soil is severely limited as a site for local roads and streets. Strengthening the base material for local roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is I. No woodland ordination symbol is assigned.

Ap—Allison silt loam, frequently flooded. This nearly level, very deep, well drained soil is on flood plains. It is subject to frequent flooding for very brief to long periods during the winter and spring. Individual areas are irregular in shape and range from 5 to 250 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 10 inches thick. The subsurface layer is about 48 inches thick. It is very dark grayish brown, firm silt loam in the upper part and very dark grayish brown, very dark gray, and dark brown, firm silty clay loam in the lower part. The subsoil to a depth of 80 inches or more is dark brown, firm silty clay loam. In some places the dark surface layer is less than 24 inches thick. In other places free carbonates are throughout the subsoil.

Included with this soil in mapping are the well drained Du Page, moderately well drained Tice, and very poorly drained Sawabash soils. Du Page soils have more sand in the upper part of the subsoil than the Allison soil. They are in the slightly lower positions. Tice and Sawabash soils are in the lower lying areas. Included soils make up about 10 percent of the unit.

The available water capacity is very high in the Allison soil. Permeability is moderate. Surface runoff is slow. The content of organic matter in the surface layer is moderate.

Most areas of this soil are used for cultivated crops. A few areas are used for woodland, hay, or pasture.

This soil is well suited to corn and soybeans, but damage from floodwaters can be expected. Flooding is the major management concern. Small grain planted in the fall is subject to severe damage during periods of prolonged flooding. Planting in late spring and using short-season varieties of adapted crops help to minimize the damage or loss caused by flooding. Levees and dikes help to control flooding, but they are extremely expensive if properly constructed. Crusting is also a concern. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control scouring by floodwater, help to prevent crusting, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to spring chisel, spring moldboard, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture, but prolonged flooding can damage these crops in winter and spring. Levees and dikes help to control flooding. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

Because of the flooding, this soil is generally unsuitable for use as a site for dwellings. Because of low strength, the flooding, and the potential for frost action, the soil is severely limited as a site for local roads and streets. Strengthening the base material for local roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by flooding and by frost action.

The land capability classification is IIw. No woodland ordination symbol is assigned.

AtB2—Alvin-Spinks complex, 2 to 6 percent slopes, eroded. This map unit consists of gently sloping, very deep, well drained soils in undulating areas on outwash plains, terraces, till plains, and recessional moraines. The Alvin soil is on the lower part of side slopes and on toe slopes. The Spinks soil is on

shoulder slopes and the summits of ridgetops. Individual areas of this unit are elongated or irregularly shaped and range from 2 to 50 acres in size. They are about 50 percent Alvin soil and 35 percent Spinks soil. The two soils occur as areas so intricately mixed or so small that it was not practical to map them separately.

Typically, the surface layer of the Alvin soil is dark brown fine sandy loam. It contains dark brown material from the subsoil. It is about 10 inches thick. The subsoil extends to a depth of 80 inches or more. The upper part is dark brown, friable fine sandy loam and sandy loam. The lower part is dark brown, friable loamy sand that has pockets of sandy loam. In a few small areas the lower part of the subsoil and the underlying material have gravelly textures. In a few places the surface layer is darker.

Typically, the surface layer of the Spinks soil is dark brown fine sand. It contains yellowish brown material from the subsurface layer. It is about 8 inches thick. The subsurface layer extends to a depth of 80 inches or more. The upper part is yellowish brown, loose fine sand. The lower part is yellowish brown, loose fine sand that has bands of dark brown loamy fine sand. In places the bands in the subsurface layer are less than 6 inches thick. In a few small areas the surface layer is darker.

Included with these soils in mapping are areas of the somewhat poorly drained Whitaker soils and the very poorly drained Mahalasville and Treaty soils on toe slopes and in depressions. Included soils make up about 15 percent of the unit.

The available water capacity is moderate in the Alvin soil and low in the Spinks soil. Permeability is moderately rapid in the Alvin soil. It is rapid in the upper part of the solum in the Spinks soil, moderately rapid in the lower part of the solum, and rapid in the underlying material. Surface runoff is medium on both soils. The content of organic matter in the surface layer is low.

Most areas are used for cultivated crops. Many areas are used for hay or pasture or are idle land. A few areas are used as woodland.

These soils are well suited to corn, soybeans, and small grain. Water erosion and soil blowing are hazards, and droughtiness is a limitation. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage, planting buffer strips or vegetative barriers, ridging at an angle to the prevailing wind, or using a combination of these practices or by maintaining a permanent cover of vegetation. Irrigation helps to overcome the droughtiness. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion and soil blowing, reduce the evaporation rate, and help to maintain tilth, infiltration, aeration, and the content of organic matter. These soils are well suited to no-till and ridge-till tillage systems and to spring chisel systems if the new crop is planted into corn residue.

These soils are well suited to grasses and legumes, such as smooth bromegrass and alfalfa, for hay and pasture. Water erosion and soil blowing are hazards, and droughtiness is a limitation. Irrigation helps to overcome the droughtiness. Deep-rooted legumes and drought-tolerant species should be selected. Growing grasses and legumes helps to control runoff, erosion, and soil blowing. Overgrazing and grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during the summer and during wet periods help to keep the pasture in good condition.

These soils are well suited to trees. Plant competition is the main management concern in areas of the Alvin soil. The main management concerns in areas of the Spinks soil are the equipment limitation, seedling mortality, and plant competition. Equipment tends to bog down in sandy soils when they are dry. The equipment limitation can be reduced by delaying timber harvest until the soil is moist or frozen. Competing vegetation can be controlled by spraying, cutting, or girdling. Site preparation, special planting stock, and overplanting help to overcome seedling mortality. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

These soils are suitable as sites for dwellings. Because of the potential for frost action, the Alvin soil is moderately limited as a site for local roads and streets. The Spinks soil is suitable as a site for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is IIe. The woodland ordination symbol is 4A for the Alvin soil and 4S for the Spinks soil.

Ba—Battleground silt loam, protected. This nearly level, very deep, well drained soil is on flood plains. It is protected from flooding by levees and pumps. Individual areas are irregular in shape and range from 100 to 275 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 10 inches thick. The subsurface

layer also is very dark grayish brown silt loam. It is about 9 inches thick. The subsoil to a depth of 80 inches or more is dark brown, friable silt loam. In some places the dark surface layer is more than 23 inches thick. In other places the surface layer and subsoil do not have free carbonates.

Included with this soil in mapping are the somewhat excessively drained Ouiatenon soils that have a sandy substratum and the somewhat poorly drained Tice soils. Ouiatenon soils are in areas adjacent to stream channels. Tice soils are in the lower lying areas. Included soils make up about 10 percent of the unit.

The available water capacity is very high in the Battleground soil. Permeability is moderate. Surface runoff is slow. The content of organic matter in the surface layer is moderate.

Most areas of this soil are used for cultivated crops.

This soil is well suited to corn, soybeans, and small grain. Crusting is a management concern. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to spring moldboard, chisel, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. The main management concerns are the equipment limitation and plant competition. Rare flooding may hinder harvesting and logging. The equipment limitation can be reduced by delaying timber harvest until dry periods. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of possible flooding as a result of levee failure, this soil is generally unsuitable as a site for dwellings. Because of low strength and the potential for frost action, the soil is severely limited as a site for local roads and streets. Strengthening the base material for local roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is I. The woodland ordination symbol is 8A.

Bb—Battleground silt loam, frequently flooded. This nearly level, very deep, well drained soil is on flood plains. It is subject to frequent flooding for brief or long periods from fall through spring (fig. 7). Individual areas are irregular in shape and range from 2 to 600 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 10 inches thick. The subsurface layer is very dark grayish brown silty clay loam about 9 inches thick. The subsoil to a depth of 80 inches or more is dark brown, friable silty clay loam and silt loam. In some places the dark surface layer is more than 23 inches thick. In other places the surface layer and subsoil do not have free carbonates.

Included with this soil in mapping are the somewhat excessively drained Ouiatenon soils that have a sandy substratum, the well drained Lash soils, the somewhat poorly drained Tice soils, and the very poorly drained Sawabash soils. Ouiatenon and Lash soils are in areas adjacent to stream channels. Lash soils have more sand and less clay in the subsoil than the Battleground soil. Tice and Sawabash soils are in the lower lying areas. Included soils make up about 15 percent of the unit.

The available water capacity is very high in the Battleground soil. Permeability is moderate. Surface runoff is slow. The content of organic matter in the surface layer is moderate.

Most areas of this soil are used for cultivated crops. A few areas are used for woodland, hay, or pasture.

This soil is well suited to corn and soybeans, but damage from floodwaters can be expected. Flooding is the major management concern. Small grain planted in the fall is subject to severe damage during periods of prolonged flooding. Late spring planting of short-season varieties of adapted crops helps to minimize the damage or loss caused by flooding. Levees and dikes help to control flooding, but they are extremely expensive if properly constructed. Crusting is also a concern. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control scouring by floodwater, help to prevent crusting, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to spring moldboard, spring chisel, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture, but prolonged flooding can damage these crops in winter and early spring. Levees and dikes help to control flooding. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can

Figure 7.—Flooding on a golf course in an area of Battleground silt loam, frequently flooded.

cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. The main management concerns are the equipment limitation and plant competition. The frequent flooding can delay planting and harvesting. The equipment limitation can be reduced by delaying timber harvest until dry periods. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of the flooding, this soil is generally unsuited to use as a site for dwellings. Because of low strength, the flooding, and the potential for frost action, the soil is severely limited as a site for local roads and streets. Strengthening the base material for local roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic.

Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by flooding and by frost action.

The land capability classification is IIw. The woodland ordination symbol is 8A.

BgA—Beecher silt loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on recessional moraines. It is deep over compact glacial till. Individual areas are irregular in shape and range from 2 to 60 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsoil is olive brown and light olive brown, mottled, firm silty clay loam about 35 inches thick. The underlying material to a depth of 60 inches or more is light olive brown, mottled silty clay loam. In places the surface layer is more than 10 inches thick. In a few small areas stratified material is above the glacial till. In some places the underlying glacial till is loam.

Included with this soil in mapping are a few small areas of the moderately well drained Marker soils on small rises and in the more sloping areas along drainageways. Also included are small areas of the poorly drained Drummer soils in depressions and drainageways. Included soils make up about 10 percent of the unit.

The available water capacity is high in the Beecher soil. Permeability is slow. Surface runoff also is slow. The content of organic matter in the surface layer is moderate. The water table is at a depth of 1 to 3 feet, mainly in winter and spring.

Most areas of this soil are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Wetness is a major management concern. Crusting is also a problem. Subsurface drains can be used to remove excess water if adequate outlets are available. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to moldboard, fall chisel, and ridge-till tillage systems. It is also well suited to no-till if the new crop is planted into soybean residue or in residue-cleared rows.

This soil is well suited to grasses and legumes for hay and pasture. Reed canarygrass and ladino clover are adapted grass species. The wetness is a limitation. A drainage system is necessary for high yields. Subsurface drains can be used to remove excess water if adequate outlets are available. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. The main management concern is the windthrow hazard. Using harvest methods that do not leave the remaining trees isolated or widely spaced helps to overcome the windthrow hazard. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of the wetness, this soil is severely limited as a site for dwellings. Installing subsurface drains helps to lower the water table. Constructing buildings on raised, well compacted fill material also helps to overcome the wetness. Because of low strength and the potential for frost action, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads and streets on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by frost action.

The land capability classification is IIw. The woodland ordination symbol is 4C.

BkF—Berks channery silt loam, 25 to 60 percent slopes. This steep and very steep, well drained soil is on upland hillslopes. It is moderately deep over interbedded siltstone and shale bedrock. Individual areas are long and narrow and range from 2 to 30 acres in size.

Typically, the surface layer is very dark grayish brown channery silt loam about 3 inches thick. The subsurface layer is brown, friable channery silt loam about 5 inches thick. The subsoil is about 21 inches thick. It is light yellowish brown, friable very channery silt loam in the upper part and pale brown, firm channery silt loam in the lower part. Below this to a depth of 60 inches or more is siltstone bedrock. In a few areas the underlying bedrock is at a depth of less than 20 inches or more than 40 inches. In the northeastern part of the county, the bedrock is New Albany shale.

Included with this soil in mapping are the moderately well drained High Gap Variant soils. These soils are on the upper part of side slopes and on ridgetops. Also included are areas of bedrock escarpments. Included areas make up about 15 percent of the unit.

The available water capacity is low in the Berks soil. Permeability is moderate in the upper part of the subsoil and moderately rapid in the lower part. Surface runoff is

very rapid. The content of organic matter in the surface layer is moderate.

Most areas of this soil are used as woodland. A few small areas are used for pasture.

This soil is generally unsuited to cultivated crops and hay. It is poorly suited to pasture. Erosion is a severe hazard. Because of the slope, the use of standard farm machinery is restricted.

This soil is poorly suited to trees. The main management concerns are the hazard of erosion, the equipment limitation, and seedling mortality. Using selective cutting rather than clear cutting, establishing haul roads on the contour, and preserving as much understory vegetation as possible help to control erosion. Special operations, such as yarding logs uphill with cable, may be needed to minimize the use of rubber-tired and crawler tractors. Site preparation, special planting stock, and overstocking help to overcome seedling mortality. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of the slope, this soil is generally unsuitable as a site for dwellings and is severely limited as a site for local roads and streets. Cuts and fills are needed. Where possible, building the roads on the contour helps to overcome the slope.

The land capability classification is VIIe. The woodland ordination symbol is 3R.

BlA—Billett fine sandy loam, gravelly substratum, 0 to 2 percent slopes. This nearly level, well drained soil is on terraces and outwash plains. It is deep over gravelly coarse sand. Individual areas are irregular in shape and range from 3 to 200 acres in size.

Typically, the surface layer is very dark grayish brown fine sandy loam about 9 inches thick. The subsoil is about 51 inches thick. It is dark brown, friable fine sandy loam in the upper part; dark brown, firm sandy loam and friable fine sandy loam in the next part; and dark brown, very friable loamy sand in the lower part. The underlying material to a depth of 65 inches or more is yellowish brown gravelly coarse sand. In some places the dark surface layer is 10 or more inches thick. In a few small areas the upper part of the subsoil has more clay and gravel. In some places the surface layer is lighter colored.

Included with this soil in mapping are small areas of the well drained Troxel soils in depressions. These soils have more clay and less sand in the subsoil than the Billett soil and have a dark surface layer more than 24 inches thick. Also included are the excessively drained Rodman soils on steep breaks. Included soils make up about 5 percent of the map unit.

The available water capacity is moderate in the Billett soil. Permeability is moderately rapid in the upper part of the solum, rapid in the lower part of the solum, and very rapid in the underlying material. Surface runoff is slow. The content of organic matter in the surface layer is moderately low.

Most areas of this soil are used for cultivated crops. A few areas are used for hay or pasture.

This soil is fairly well suited to corn, soybeans, and small grain. Soil blowing is a hazard, and droughtiness is a limitation. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage, planting buffer strips or vegetative barriers, ridging at an angle to the prevailing wind, or using a combination of these practices or by maintaining a permanent cover of vegetation. Irrigation helps to overcome the droughtiness. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control soil blowing, reduce the evaporation rate, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems. It is also well suited to spring moldboard and chisel tillage systems if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as smooth bromegrass and alfalfa, for hay and pasture. Droughtiness is a limitation, and soil blowing is a hazard. Irrigation helps to overcome the droughtiness. Deep-rooted legumes and drought-tolerant species should be selected. Growing grasses and legumes helps to control soil blowing. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during the summer and during wet periods help to keep the pasture in good condition.

This soil is suitable for use as a site for dwellings. Because of the potential for frost action, the soil is moderately limited as a site for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is IIIs. No woodland ordination symbol is assigned.

BlB2—Billett fine sandy loam, gravelly substratum, 2 to 6 percent slopes, eroded. This gently sloping, well drained soil is on rises and breaks on terraces and outwash plains. It is deep over gravelly coarse sand. Individual areas are irregular in shape and range from 3 to 25 acres in size.

Typically, the surface layer is very dark grayish brown fine sandy loam about 9 inches thick. It contains dark brown material from the subsoil. The subsoil is 48

inches thick. It is dark brown, friable fine sandy loam and sandy loam in the upper part and dark yellowish brown, very friable loamy sand in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown gravelly coarse sand. In a few areas, more gravel is in the subsoil or gravelly sand is within a depth of 40 inches. In some places the dark surface layer is more than 10 inches thick. In other places the surface layer is lighter colored.

Included with this soil in mapping are areas of the excessively drained Rodman soils on steep breaks, small areas of severely eroded soils that have a gravelly surface soil and have slopes of more than 6 percent, and areas of the well drained Troxel soils in depressions. Troxel soils have more clay and less sand in the subsoil than the Billett soil and have a dark surface layer more than 24 inches thick. Included soils make up about 15 percent of the unit.

The available water capacity is moderate in the Billett soil. Permeability is moderately rapid in the upper part of the solum, rapid in the lower part of the solum, and very rapid in the underlying material. Surface runoff is medium. The content of organic matter in the surface layer is moderately low.

Most areas of this soil are used for cultivated crops. Some areas are used for hay or pasture.

This soil is fairly well suited to corn, soybeans, and small grain. Water erosion and soil blowing are hazards, and droughtiness is a limitation. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, conservation tillage, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage, planting buffer strips or vegetative barriers, ridging at an angle to the prevailing wind, or using a combination of these practices or by maintaining a permanent cover of vegetation. Irrigation helps to overcome the droughtiness. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control soil blowing and erosion, reduce the evaporation rate, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems. It is also well suited to spring moldboard and chisel tillage if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as smooth bromegrass and alfalfa, for hay and pasture. Water erosion and soil blowing are hazards. Growing grasses and legumes for hay and pasture helps to control runoff, soil blowing, and water erosion. Droughtiness is a limitation. Irrigation helps to overcome the droughtiness. Deep-rooted legumes and drought-tolerant species should be selected. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, timely deferment of grazing, and restricted use during the summer and during wet periods help to keep the pasture in good condition.

This soil is suitable as a site for dwellings. Because of the potential for frost action, the soil is moderately limited as a site for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is IIIe. No woodland ordination symbol is assigned.

BmA—Billett fine sandy loam, moderately wet, 0 to 2 percent slopes. This nearly level, very deep, moderately well drained soil is on till plains and recessional moraines. Individual areas are irregular in shape and range from 2 to 20 acres in size.

Typically, the surface layer is very dark grayish brown fine sandy loam about 9 inches thick. The subsoil extends to a depth of 80 inches. The upper part is dark yellowish brown and yellowish brown, firm fine sandy loam. The next part is yellowish brown, mottled, friable sandy loam and very friable loamy sand. The lower part is gray, mottled, friable sandy loam that has pockets of loamy sand. In some areas the surface layer is lighter colored. In other areas the dark surface layer is more than 10 inches thick.

Included with this soil in mapping are a few small areas of the somewhat excessively drained Oakville soils on rises. Also included are small areas of the somewhat poorly drained La Hogue soils at the lower elevations. Included soils make up about 15 percent of the unit.

The available water capacity is moderate in the Billett soil. Permeability is moderately rapid. Surface runoff is slow. The content of organic matter in the surface layer is moderately low. The water table is at a depth of 3 to 6 feet in winter and early spring.

Most areas of this soil are used for cultivated crops. Some areas are used for hay or pasture.

This soil is fairly well suited to corn, soybeans, and small grain. Soil blowing is a hazard, and droughtiness is a limitation. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage, planting buffer strips or vegetative barriers, ridging at an angle to the prevailing wind, or using a combination of these practices or by

maintaining a permanent cover of vegetation. Irrigation helps to overcome the droughtiness. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control soil blowing, reduce the evaporation rate, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems. It is also well suited to spring moldboard and chisel tillage systems if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as smooth bromegrass and alfalfa, for hay and pasture. Droughtiness is a limitation, and soil blowing is a hazard. Irrigation helps to overcome the droughtiness. Deep-rooted legumes and drought-tolerant species should be selected. Growing grasses and legumes helps to control soil blowing. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during the summer and during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is moderate. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

This soil is suitable as a site for dwellings without basements. The wetness is a moderate limitation on sites for dwellings with basements. Installing subsurface drains helps to lower the water table. Because of the potential for frost action, the soil is moderately limited as a site for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is IIIs. The woodland ordination symbol is 3A.

BnA—Billett loam, gravelly substratum, 0 to 2 percent slopes. This nearly level, well drained soil is on terraces and outwash plains. It is deep over gravelly coarse sand. Individual areas are irregular in shape and range from 2 to 900 acres in size.

Typically, the surface layer is very dark grayish brown loam about 9 inches thick. The subsoil is about 47 inches thick. It is dark brown, friable loam in the upper part; dark brown, friable sandy loam in the next part; and dark brown, very friable loamy sand in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown gravelly coarse sand. In some places the dark surface layer is 10 or more inches thick. In a few small areas the upper part of the subsoil has less sand. In places the surface layer is lighter colored.

Included with this soil in mapping are small areas of the well drained Troxel soils in depressions. These soils have more clay and less sand in the subsoil than the Billett soil and have a dark surface layer more than 24 inches thick. Also included are the excessively drained Rodman soils on steep breaks. Included soils make up about 5 percent of the unit.

The available water capacity is moderate in the Billett soil. Permeability is moderately rapid in the upper part of the solum, rapid in the lower part of the solum, and very rapid in the underlying material. Surface runoff is slow. The content of organic matter in the surface layer is moderately low.

Most areas of this soil are used for cultivated crops. A few areas are used for hay or pasture.

This soil is fairly well suited to corn, soybeans, and small grain. Droughtiness is a limitation. Irrigation helps to overcome the droughtiness. Crusting is also a concern. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops and green manure crops help to minimize crusting and evaporation and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to moldboard, chisel, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as smooth bromegrass and alfalfa, for hay and pasture. Droughtiness is a limitation. Irrigation helps to overcome the droughtiness. Deep-rooted legumes and drought-tolerant species should be selected. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during the summer and during wet periods help to keep the pasture in good condition.

This soil is suitable as a site for dwellings. Because of the potential for frost action, the soil is moderately limited as a site for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is IIIs. No woodland ordination symbol is assigned.

BnB2—Billett loam, gravelly substratum, 2 to 6 percent slopes, eroded. This gently sloping, well drained soil is on breaks and along drainageways on terraces and outwash plains. It is deep over gravelly coarse sand. Individual areas are irregular in shape and range from 2 to 40 acres in size.

Typically, the surface layer is very dark grayish

brown loam about 9 inches thick. It contains dark brown material from the subsoil. The subsoil is 37 inches thick. It is dark brown, firm loam in the upper part; dark brown, friable sandy loam in the next part; and dark brown, very friable loamy sand in the lower part. The underlying material to a depth of 60 inches or more is brown gravelly coarse sand. In a few areas, the subsoil has more gravel or gravelly coarse sand is within a depth of 40 inches. In places the dark surface layer is more than 10 inches thick. In a few areas the surface layer is lighter colored.

Included with this soil in mapping are areas of the excessively drained Rodman soils on steep breaks and small areas of severely eroded soils that have a gravelly surface soil and have slopes of more than 6 percent. Also included are the well drained Troxel soils in depressions. Troxel soils have more clay and less sand in the subsoil than the Billett soil and have a dark surface layer more than 24 inches thick. Included soils make up about 15 percent of the unit.

The available water capacity is moderate in the Billett soil. Permeability is moderately rapid in the upper part of the solum, rapid in the lower part of the solum, and very rapid in the underlying material. Surface runoff is medium. The content of organic matter in the surface layer is moderately low.

Most areas of this soil are used for cultivated crops. Some areas are used for hay or pasture.

This soil is fairly well suited to corn, soybeans, and small grain. Erosion is a hazard, and droughtiness is a limitation. Crusting is also a concern. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, a system of conservation tillage that leaves a protective cover of crop residue on the surface, cover crops, green manure crops, grade-stabilization structures, critical-area plantings, and crop rotations. Grassed waterways help to control erosion in the drainageways. Irrigation helps to overcome the droughtiness. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion, minimize crusting and evaporation, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems. It is also well suited to spring moldboard and spring chisel tillage systems if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as smooth bromegrass and alfalfa, for hay and pasture. Erosion is a hazard. Growing grasses and legumes for hay and pasture helps to control runoff and erosion. Droughtiness is a limitation. Irrigation helps to overcome the droughtiness. Deep-rooted legumes and drought-tolerant species should be selected. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, timely deferment of grazing, and restricted use during the summer and during wet periods help to keep the pasture in good condition.

This soil is suitable as a site for dwellings. Because of the potential for frost action, the soil is moderately limited as a site for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is IIIe. No woodland ordination symbol is assigned.

BoA—Bowes silt loam, 0 to 2 percent slopes. This nearly level, well drained soil is on outwash plains. It is deep or very deep over gravelly coarse sand. Individual areas are irregular in shape and range from 2 to 180 acres in size.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is about 47 inches thick. It is dark brown and dark yellowish brown, firm silt loam and silty clay loam in the upper part; dark yellowish brown, firm clay loam, firm sandy clay loam, friable fine sandy loam, and very friable fine sand in the next part; and dark brown, firm gravelly sandy clay loam in the lower part. The underlying material to a depth of 60 inches or more is dark yellowish brown gravelly coarse sand. In places the dark surface layer is 10 or more inches thick. In a few areas the upper part of the subsoil has more sand. In some places the surface layer is lighter colored.

Included with this soil in mapping are small areas of the moderately well drained Bowes Variant and somewhat poorly drained Lafayette soils in the slightly lower positions in the landscape. Also included, in depressions, are the very poorly drained Mahalasville soils that have a gravelly substratum. Included soils make up about 12 percent of the unit.

The available water capacity is high in the Bowes soil. Permeability is moderate in the upper part of the subsoil, moderately rapid in the lower part of the subsoil, and very rapid in the underlying material. Surface runoff is slow. The content of organic matter in the surface layer is moderate.

Most areas of this soil are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Crusting is a management concern. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve

tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to moldboard, chisel, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

The shrink-swell potential is a moderate limitation if this soil is used as a site for dwellings. Foundations and footings should be strengthened. Backfilling with coarser material helps to prevent the structural damage caused by shrinking and swelling of the soil. Because of low strength and the potential for frost action, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is I. No woodland ordination symbol is assigned.

BpA—Bowes Variant silt loam, 0 to 2 percent slopes. This nearly level, moderately well drained soil is on outwash plains. It is deep or very deep over gravelly sand. Individual areas are irregular in shape and range from 2 to 25 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsoil is about 44 inches thick. The upper part is dark brown and dark yellowish brown, firm silt loam, silty clay loam, and clay loam; the next part is dark yellowish brown, mottled, firm loam; and the lower part is dark brown, mottled gravelly sandy loam. The underlying material to a depth of 60 inches or more is brown gravelly sand. In some places the dark surface layer is 10 or more inches thick. In some areas the surface layer is lighter colored.

Included with this soil in mapping are small areas of the somewhat poorly drained Lafayette soils at the slightly lower elevations and the well drained Bowes soils in the slightly higher areas. Also included, in slight depressions, are the very poorly drained Mahalasville soils that have a gravelly substratum. Included soils make up about 15 percent of the unit.

The available water capacity is high in the Bowes Variant soil. Permeability is moderate in the upper part of the subsoil, moderately rapid in the lower part of the subsoil, and very rapid in the underlying material. Surface runoff is slow. The content of organic matter in the surface layer is moderate. The water table is at a depth of 2 to 6 feet in winter and spring.

Most areas of this soil are used for cultivated crops. A few areas are used for hay and pasture.

This soil is well suited to corn, soybeans, and small grain. Crusting is a management concern. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to moldboard, chisel, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

Wetness and the shrink-swell potential are moderate limitations if this soil is used as a site for dwellings without basements. The wetness is a severe limitation on sites for dwellings with basements. Foundations and footings should be strengthened. Backfilling with coarser material helps to prevent the structural damage caused by shrinking and swelling of the soil. Installing subsurface drains helps to lower the water table. Because of low strength and the potential for frost action, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is I. No woodland ordination symbol is assigned.

CaA—Camden silt loam, 0 to 2 percent slopes. This nearly level, very deep, well drained soil is on till plains. Individual areas are irregular in shape and range from 2 to 100 acres in size.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is about 55 inches thick. It is dark yellowish brown, firm silt loam and silty clay loam in the upper part; dark brown, firm loam, friable sandy loam, and friable fine sandy loam in the next part; and dark yellowish brown, friable loam in the lower part. The underlying material to a depth of 70 inches or more is yellowish brown loam that has strata of sandy loam. In places the surface layer is darker. In a few small areas, loam glacial till is at a depth of less than 60 inches. In some places the upper part of the subsoil has more sand. In other places the depth to the

underlying material is more than 65 inches.

Included with this soil in mapping are the somewhat poorly drained Fincastle and Starks soils in the slightly lower positions in drainageways and in depressions. Also included are areas of the moderately well drained Rockfield soils at the slightly lower elevations. Included soils make up about 15 percent of the unit.

The available water capacity is high in the Camden soil. Permeability is moderate. Surface runoff is slow. The content of organic matter in the surface layer is moderately low.

Most areas of this soil are used for cultivated crops. Some areas are used for hay or pasture. A few small areas are used as woodland.

This soil is well suited to corn, soybeans, and small grain. Crusting is a management concern. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to moldboard, chisel, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is severe. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

The shrink-swell potential is a moderate limitation if this soil is used as a site for dwellings without basements. The soil is suitable as a site for dwellings with basements. Foundations and footings should be strengthened. Backfilling with coarser material helps to prevent the structural damage caused by shrinking and swelling of the soil. Because of low strength and the potential for frost action, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is I. The woodland ordination symbol is 7A.

CfB—Carmi sandy loam, 2 to 6 percent slopes. This gently sloping, well drained soil is on rises and breaks on terraces and outwash plains. It is deep over sand and very gravelly coarse sand. Individual areas are elongated or irregularly shaped and range from 2 to 200 acres in size.

Typically, the surface layer is very dark gray sandy loam about 10 inches thick. The subsurface layer is very dark gray, friable sandy loam about 3 inches thick. The subsoil is about 32 inches thick. It is dark brown, friable sandy loam and gravelly sandy loam in the upper part; dark brown, friable very gravelly sandy loam in the next part; and dark brown, very friable very gravelly loamy sand in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown, stratified sand and very gravelly coarse sand. In some places, the upper part of the subsoil has more gravel or the lower part of the subsoil has less gravel. In a few areas the surface layer is less than 10 inches thick.

Included with this soil in mapping are small areas of the well drained Desker soils in the more sloping areas. These soils have a solum that is less than 40 inches thick. Also included are the well drained Troxel and excessively drained Sparta soils. Troxel soils are in depressions. They have more clay and less sand in the subsoil than the Carmi soil and have a dark surface layer more than 24 inches thick. Sparta soils are in positions on the landscape similar to those of the Carmi soil. Included soils make up about 15 percent of the unit.

The available water capacity is low in the Carmi soil. Permeability is moderately rapid in the solum and very rapid in the underlying material. Surface runoff is medium. The content of organic matter in the surface layer is moderate.

Most areas of this soil are used for cultivated crops. Some areas are used for hay, pasture, or woodland.

This soil is well suited to corn, soybeans, and small grain. Water erosion and soil blowing are hazards. Droughtiness is a limitation. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage, planting buffer strips or vegetative barriers, ridging at an angle to the prevailing wind, or using a combination of these practices or by maintaining a permanent cover of vegetation. Irrigation helps to overcome the droughtiness. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion and soil blowing, reduce the evaporation rate, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-

till and ridge-till tillage systems. It is also well suited to spring moldboard and chisel tillage systems if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as smooth bromegrass and alfalfa, for hay and pasture. Water erosion and soil blowing are hazards, and droughtiness is a limitation. Irrigation helps to overcome the droughtiness. Deep-rooted legumes and drought-tolerant species should be selected. Growing grasses and legumes helps to control runoff, soil blowing, and erosion. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during the summer and during wet periods help to keep the pasture in good condition.

This soil is suitable as a site for dwellings. Because of the potential for frost action, the soil is moderately limited as a site for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is IIe. No woodland ordination symbol is assigned.

CgA—Carmi loam, 0 to 2 percent slopes. This nearly level, well drained soil is on terraces. It is deep over very gravelly coarse sand. Individual areas are irregular in shape and range from 3 to 800 acres in size.

Typically, the surface layer is very dark gray loam about 11 inches thick. The subsurface layer is very dark gray and very dark grayish brown, friable loam about 9 inches thick. The subsoil is about 34 inches thick. It is dark brown, friable loam in the upper part; dark brown, friable gravelly loam and gravelly sandy loam in the next part; and dark brown, very friable gravelly loamy sand in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown very gravelly coarse sand. In some areas the dark surface layer is less than 10 inches thick. In places the upper part of the subsoil has more clay and gravel. In some small areas the underlying very gravelly coarse sand is at a depth of less than 40 inches.

Included with this soil in mapping are areas of the well drained Troxel soils in depressions. These soils have more clay and less sand in the subsoil than the Carmi soil and have a dark surface layer more than 24 inches thick. Also included are the excessively drained Sparta soils on rises. Included soils make up about 10 percent of the unit.

The available water capacity is moderate in the Carmi soil. Permeability is moderately rapid in the solum and very rapid in the underlying material. Surface runoff is slow. The content of organic matter in the surface layer is moderate.

Most areas of this soil are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Droughtiness is a limitation. Crusting is also a concern. Irrigation helps to overcome the droughtiness. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops minimize crusting and evaporation and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to moldboard, chisel, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as smooth bromegrass and alfalfa, for hay and pasture. Droughtiness is a limitation. Irrigation helps to overcome the droughtiness. Deep-rooted legumes and drought-tolerant species should be selected. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during the summer and during wet periods help to keep the pasture in good condition.

This soil is suitable as a site for dwellings. Because of the potential for frost action, the soil is moderately limited as a site for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is IIs. No woodland ordination symbol is assigned.

Ck—Ceresco sandy loam, gravelly substratum, rarely flooded. This nearly level, somewhat poorly drained soil is on flood plains. It is moderately deep or deep over gravelly sand. It is subject to rare flooding for brief periods during the winter and spring. Individual areas are irregular in shape and range from 2 to 80 acres in size.

Typically, the surface layer is very dark grayish brown sandy loam about 10 inches thick. The subsurface layer is very dark grayish brown, friable sandy loam about 6 inches thick. The subsoil is about 24 inches thick. It is dark brown, mottled, friable sandy loam in the upper part and dark yellowish brown, mottled, friable fine sandy loam in the lower part. The underlying material to a depth of 60 inches or more is dark brown, mottled gravelly sand. In places the subsoil has more clay. In a few areas the underlying material does not contain gravel. In some areas the surface layer is lighter colored. In other areas free carbonates are throughout the surface layer and subsoil.

Included with this soil in mapping are the somewhat

excessively drained Ouiatenon soils in areas adjacent to stream channels. Also included are the very poorly drained Cohoctah soils at the slightly lower elevations and in areas adjacent to uplands. Included soils make up about 15 percent of the unit.

The available water capacity is moderate in the Ceresco soil. Permeability is moderately rapid in the solum and very rapid in the underlying material. Surface runoff is very slow. The content of organic matter in the surface layer is moderate. The water table is at a depth of 1 to 2 feet during the winter and spring.

Most areas of this soil are used for cultivated crops. Some areas are used for woodland, hay, or pasture.

This soil is well suited to corn, soybeans, and small grain. Wetness and soil blowing are the major management concerns. Subsurface drains can be used to remove excess water if adequate outlets are available. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control soil blowing and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till if the new crop is planted into soybean residue or in residue-cleared rows. It is also well suited to spring moldboard and spring chisel tillage systems if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. Wetness is a limitation, and soil blowing is a hazard. Subsurface drains can be used to remove excess water if adequate outlets are available. Growing grasses and legumes helps to control soil blowing. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is fairly well suited to trees. The main management concerns are the equipment limitation and plant competition. The rare flooding may hinder harvesting and logging. The equipment limitation can be reduced by delaying timber harvest until dry periods. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of the flooding and the wetness, this soil is generally unsuitable as a site for dwellings. Because of the potential for frost action, the soil is severely limited as a site for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is IIw. The woodland ordination symbol is 4W.

Cl—Ceresco loam, gravelly substratum, occasionally flooded. This nearly level, somewhat poorly drained soil is on flood plains. It is moderately deep or deep over gravelly sand and very gravelly sand. It is subject to occasional flooding for brief periods during the winter and spring. Individual areas are long and narrow and range from 2 to 80 acres in size.

Typically, the surface layer is very dark gray loam about 10 inches thick. The subsurface layer is very dark grayish brown, friable loam about 3 inches thick. The subsoil is friable fine sandy loam about 18 inches thick. It is mottled. The upper part is dark yellowish brown, and the lower part is dark grayish brown. The underlying material to a depth of 60 inches or more is grayish brown gravelly sand and very gravelly sand. In places the subsoil has more clay. In a few areas the underlying material does not contain gravel. In some areas the surface layer is lighter colored. In other areas free carbonates are throughout the surface layer and subsoil.

Included with this soil in mapping are the somewhat excessively drained Ouiatenon soils in areas adjacent to stream channels. Also included are the very poorly drained Cohoctah soils at the slightly lower elevations and in areas adjacent to uplands. Included soils make up about 15 percent of the unit.

The available water capacity is low in the Ceresco soil. Permeability is moderately rapid in the solum and very rapid in the underlying material. Surface runoff is very slow. The content of organic matter in the surface layer is moderate. The water table is at a depth of 1 to 2 feet during the winter and spring.

Most areas of this soil are used for cultivated crops. Some areas are used for woodland, hay, or pasture.

This soil is well suited to corn and soybeans, but damage from floodwaters can be expected. Wetness and the flooding are the major management concerns. Crusting is also a concern. Subsurface drains can be used to remove excess water if adequate outlets are available. Small grain seeded in the fall is subject to severe damage during periods of prolonged flooding. Late spring planting of short-season varieties of adapted crops helps to minimize damage or loss caused by flooding. Dikes or levees can be used to protect some areas from flooding, but they are extremely expensive if properly constructed. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover

crops help to control scouring by floodwater, help to prevent crusting, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to spring moldboard, spring chisel, and no-till tillage systems if the new crop is planted in residue-cleared rows.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture, but prolonged flooding can damage these crops in winter and spring. Wetness is a limitation, and flooding is a hazard. Subsurface drains can be used to remove excess water if adequate outlets are available. Some areas can be protected from flooding by levees or dikes. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is fairly well suited to trees. The main management concerns are the equipment limitation and plant competition. The flooding can delay planting and harvesting. The equipment limitation can be reduced by delaying timber harvest until dry periods. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of the flooding and the wetness, this soil is generally unsuited to use as a site for dwellings. Because of the flooding and the potential for frost action, the soil is severely limited as a site for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by flooding and by frost action.

The land capability classification is IIw. The woodland ordination symbol is 4W.

Cm—Chalmers silty clay loam. This nearly level, poorly drained soil is in depressions and drainageways on till plains. It is deep over compact glacial till. It is frequently ponded by surface runoff from adjacent areas. Individual areas are irregular in shape and range from 3 to 180 acres in size.

Typically, the surface layer is black silty clay loam about 9 inches thick. The subsurface layer is black, firm silty clay loam about 4 inches thick. The subsoil is about 32 inches thick. It is grayish brown, mottled, firm silty clay loam in the upper part and grayish brown, mottled, firm clay loam and loam in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown, mottled loam. In a few small areas, stratified material is above the underlying loam glacial till. In some areas the soil has more than 40 inches of silty material. In places the underlying glacial till is fine sandy loam.

Included with this soil in mapping are the somewhat poorly drained Toronto and Millbrook soils. These soils are in the slightly higher positions on the landscape. They make up about 10 percent of the unit.

The available water capacity is high in the Chalmers soil. Permeability is moderate in the solum and moderately slow in the underlying material. Surface runoff is very slow or ponded. The content of organic matter in the surface layer is high. The water table is at or above the surface, mainly during the winter and spring. The surface layer becomes cloddy and difficult to work if tilled when too wet.

Most areas of this soil are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Wetness and the ponding are the major management concerns. Crusting is also a concern. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to fall moldboard, fall chisel, and ridge-till tillage systems. It is also well suited to no-till if the new crop is planted into soybean residue or in residue-cleared rows.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

Because of the ponding, this soil is generally unsuited to use as a site for dwellings. Because of low strength, the ponding, and the potential for frost action, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill

material and providing adequate side ditches and culverts help to prevent the damage caused by ponding and by frost action.

The land capability classification is IIw. No woodland ordination symbol is assigned.

Co—Cohoctah fine sandy loam, gravelly substratum, rarely flooded. This nearly level, very poorly drained soil is on flood plains. It is moderately deep or deep over sand and gravelly sand. It is subject to rare flooding for brief periods during the winter and spring. It is frequently ponded by surface runoff from adjacent areas. Individual areas are irregular in shape and range from 3 to 100 acres in size.

Typically, the surface layer is very dark gray fine sandy loam about 10 inches thick. The subsurface layer is very dark gray, firm fine sandy loam about 3 inches thick. The subsoil is about 19 inches thick. It is dark grayish brown, mottled, firm fine sandy loam in the upper part and grayish brown, mottled, friable fine sandy loam and very friable loamy fine sand in the lower part. The underlying material to a depth of 60 inches or more is grayish brown, mottled loamy sand, sand, and gravelly sand. In a few areas the soil has a lighter colored overwash of silt loam or loam that is 7 to 20 inches thick. In places the depth to calcareous gravelly material is more than 60 inches. In some areas the upper part of the subsoil has less sand and more clay. In a few places, glacial till is within a depth of 60 inches and the layer of gravelly material is thin.

Included with this soil in mapping are the somewhat excessively drained Ouiatenon and somewhat poorly drained Ceresco soils at the slightly lower elevations adjacent to stream channels. These soils make up about 15 percent of the unit.

The available water capacity is moderate in the Cohoctah soil. Permeability is moderately rapid in the solum and very rapid in the underlying material. Surface runoff is very slow or ponded. The content of organic matter in the surface layer is moderate. The water table is at or above the surface, mainly during the winter and spring.

Most areas of this soil are used for cultivated crops. Some areas are used for hay, pasture, or woodland.

This soil is fairly well suited to corn, soybeans, and small grain. Wetness, the ponding, and the hazard of soil blowing are the major management concerns. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. Diverting runoff from nearby upland areas helps to minimize the ponding. Springs at the base of the steep breaks should be cut off with subsurface drains or diversions. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control soil blowing and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to spring moldboard, spring chisel, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. The wetness, the ponding, and the hazard of soil blowing are management concerns. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Growing grasses and legumes helps to control soil blowing. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is poorly suited to trees. The main management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. The equipment limitation is caused by wetness. The wetness can be overcome by performing woodland management activities during seasons of the year when the soil is relatively dry or is frozen. Site preparation, special planting stock, and overstocking help to overcome seedling mortality. Species that tolerate wetness should be planted. Using harvest methods that do not leave the remaining trees isolated or widely spaced helps to overcome the windthrow hazard. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of the ponding and the flooding, this soil is generally unsuitable as a site for dwellings. Because of the ponding and the potential for frost action, the soil is severely limited as a site for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by ponding and by frost action.

The land capability classification is IIIw. The woodland ordination symbol is 2W.

Cp—Cohoctah loam, gravelly substratum, occasionally flooded. This nearly level, very poorly drained soil is on flood plains. It is moderately deep or deep over sand and very gravelly sand. It is subject to occasional flooding for brief periods during the winter and spring. It is frequently ponded by surface runoff

from adjacent areas. Individual areas are irregular in shape and range from 2 to 350 acres in size.

Typically, the surface layer is black loam about 10 inches thick. The subsurface layer is very dark gray and very dark grayish brown, mottled, friable fine sandy loam about 10 inches thick. The subsoil is about 25 inches thick. It is dark grayish brown, mottled, friable sandy loam in the upper part and grayish brown, mottled, very friable loamy sand in the lower part. The underlying material to a depth of 60 inches or more is grayish brown, mottled, stratified sand and very gravelly sand. In a few areas the soil has a lighter colored overwash of silt loam or loam that is 7 to 20 inches thick. In some places the dark surface layer is 24 or more inches thick. In other places the underlying material does not contain gravel. In some areas the upper part of the subsoil has less sand and more clay.

Included with this soil in mapping are a few small areas of the somewhat excessively drained Ouiatenon and somewhat poorly drained Ceresco soils in the slightly higher elevations adjacent to stream channels. These soils make up about 15 percent of the unit.

The available water capacity is moderate in the Cohoctah soil. Permeability is moderately rapid in the solum and very rapid in the underlying material. Surface runoff is very slow or ponded. The content of organic matter in the surface layer is moderate. The water table is at or above the surface, mainly during the winter and spring.

Most areas of this soil are used as woodland or for cultivated crops. A few areas are used for hay or pasture.

This soil is fairly well suited to corn and soybeans, but damage from floodwater can be expected. Wetness, ponding, and flooding are the major management concerns. Crusting is also a concern. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Levees or dikes help to control flooding, but they are extremely expensive if properly constructed. Diverting runoff from nearby upland areas helps to minimize the ponding. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. Springs at the base of steep breaks should be cut off with subsurface drains or diversions. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control scouring by floodwater, help to prevent crusting, and help to maintain tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to spring chisel and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as reed canarygrass and alfalfa, for hay and pasture, but prolonged flooding can damage these crops in winter and spring. Wetness, ponding, and flooding are management concerns. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Some areas of this soil can be protected from flooding by levees or dikes. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is poorly suited to trees. The main management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. The equipment limitation is caused by wetness. The wetness can be overcome by performing woodland management activities during periods when the soil is relatively dry or is frozen. The flooding can delay planting and harvesting. Site preparation, special planting stock, and overstocking help to overcome seedling mortality. Species that tolerate wetness should be planted. Using harvest methods that do not leave the remaining trees isolated or widely spaced helps to overcome the windthrow hazard. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of the ponding and the flooding, this soil is generally unsuitable as a site for dwellings. Because of the flooding, the ponding, and the potential for frost action, the soil is severely limited as a site for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by flooding and ponding and by frost action.

The land capability classification is IIIw. The woodland ordination symbol is 2W.

CrC—Coloma sand, 6 to 15 percent slopes. This moderately sloping and strongly sloping, very deep, somewhat excessively drained soil is in undulating areas on outwash plains and terraces. Individual areas are elongated or irregularly shaped and range from 2 to 120 acres in size.

Typically, the surface layer is dark brown sand about 8 inches thick. The subsurface layer extends to a depth of 80 inches or more. The upper part is yellowish brown, very friable sand. The lower part is yellowish brown, loose sand that has dark brown bands of very friable loamy sand. In some places the lower part of the subsoil has more clay and gravel. In a few small areas the subsurface layer does not have bands of loamy

sand. In a few places the surface layer is darker.

Included with this soil in mapping are areas of steeper soils. Also included, in the more level areas, are the well drained Elston soils and Billett soils that have a gravelly substratum. Included soils make up about 15 percent of the unit.

The available water capacity is low in the Coloma soil. Permeability is rapid. Surface runoff is medium. The content of organic matter in the surface layer is low.

Most areas of this soil are idle land. Some areas are used for cultivated crops or for hay, pasture, or woodland.

This soil is generally unsuited to cultivated crops. Soil blowing is a hazard, and droughtiness is a limitation.

This soil is poorly suited to grasses and legumes, such as smooth bromegrass and alfalfa, for hay. It is fairly well suited to pasture. Soil blowing is a hazard, and the slope and droughtiness are limitations. Irrigation helps to overcome the droughtiness. Deep-rooted legumes and drought-tolerant species should be selected. Growing grasses and legumes helps to control soil blowing. Overgrazing reduces plant densities. Proper stocking rates, rotation grazing, and restricted use during the summer help to keep the pasture in good condition.

This soil is well suited to trees. The main management concerns are the equipment limitation and seedling mortality. Equipment tends to bog down in sandy soils when they are dry. The equipment limitation can be reduced by delaying timber harvest until the soil is moist or frozen. Site preparation, special planting stock, and overplanting help to overcome seedling mortality. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

The slope is a moderate limitation if this soil is used as a site for dwellings. The buildings should be designed so that they conform to the natural slope of the land. The slope is also a moderate limitation on sites for local roads and streets. Where possible, constructing the roads on the contour reduces the amount of land grading needed to overcome the slope.

The land capability classification is VIs. The woodland ordination symbol is 4S.

CtA—Crosby silt loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on till plains. It is moderately deep over compact glacial till. Individual areas are irregular in shape and range from 2 to more than 1,000 acres in size.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is about 20 inches thick. It is dark yellowish brown, mottled, firm clay loam in the upper part and yellowish brown, mottled, firm loam in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown, mottled loam. In places the surface layer is darker. In some areas the upper part of the subsoil contains less sand. In a few places compact glacial till is within a depth of 26 inches.

Included with this soil in mapping are the somewhat poorly drained Fincastle soils in the slightly lower positions. These soils have less sand in the upper part of the subsoil than the Crosby soil. Also included are small areas of the well drained Miami soils on slight rises and in the more sloping areas along drainageways and small areas of the very poorly drained Mahalasville and Treaty soils in depressions and drainageways. Included soils make up about 15 percent of the unit.

The available water capacity is moderate in the Crosby soil. Permeability is slow. Surface runoff also is slow. The content of organic matter in the surface layer is moderately low. The water table is at a depth of 1 to 3 feet in winter and spring.

Most areas of this soil are used for cultivated crops. Some areas are used for hay or pasture. A few small areas are used as woodland.

This soil is well suited to corn, soybeans, and small grain. Wetness is a major limitation. Crusting is also a concern. Subsurface drains can be used to remove excess water if adequate outlets are available. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to moldboard, fall chisel, and ridge-till tillage systems. It also is well suited to no-till if the new crop is planted into soybean residue or in residue-cleared rows.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. Wetness is a limitation. Subsurface drains can be used to remove excess water if adequate outlets are available. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is moderate. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

The wetness is a severe limitation if this soil is used as a site for dwellings. Installing subsurface drains

helps to lower the water table. Constructing buildings on raised, well compacted fill material also helps to overcome the wetness. Because of low strength and the potential for frost action, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is IIw. The woodland ordination symbol is 4A.

CwB2—Crosby-Miami complex, 2 to 6 percent slopes, eroded. This map unit consists of gently sloping soils on rises and along drainageways on till plains and recessional moraines. These soils are moderately deep over compact glacial till. The Crosby soil is somewhat poorly drained and is on toe slopes, in drainageways, and on the less sloping part of side slopes. The Miami soil is well drained and is on knolls, shoulder slopes, and the more sloping part of side slopes. Individual areas of this unit are irregular in shape and range from 2 to 300 acres in size. They are about 50 percent Crosby soil and 35 percent Miami soil. The two soils occur as areas so intricately mixed or so small that it was not practical to map them separately.

Typically, the surface layer of the Crosby soil is brown silt loam about 9 inches thick. It contains dark yellowish brown material from the subsoil. The subsoil is about 22 inches thick. The upper part is dark yellowish brown, mottled, firm silty clay loam, and the lower part is dark yellowish brown and yellowish brown, mottled, firm clay loam and loam. The underlying material to a depth of 60 inches or more is yellowish brown, mottled loam. In a few places the soil has more than 18 inches of silty material. In some areas the depth to compact glacial till is more than 40 inches or less than 26 inches. In a few areas a thin layer of stratified material is above the glacial till. In a few places the glacial till is fine sandy loam. In some areas the surface layer is darker.

Typically, the surface layer of the Miami soil is brown silt loam about 9 inches thick. It contains dark yellowish brown material from the subsoil. The subsoil is about 27 inches thick. It is dark yellowish brown, firm clay loam and loam in the upper part and dark yellowish brown, firm sandy clay loam in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown fine sandy loam. In a few places the depth to compact glacial till is less than 24 inches. In some areas the subsoil has more gravel or more sand. In places the surface layer is darker.

Included with these soils in mapping are the very poorly drained Mahalasville and Treaty soils in depressions and drainageways and the somewhat poorly drained Fincastle and Starks soils in landscape positions similar to those of the Crosby soil. Fincastle and Starks soils have less sand in the upper part of the subsoil than the Crosby soil. Also included are the well drained Richardville soils and severely eroded areas that have a surface soil of silty clay loam or clay loam. Richardville soils are in positions on the landscape similar to those of the Miami soil. They have a solum that is more than 40 inches thick. Included soils make up about 15 percent of the unit.

The available water capacity is moderate in the Crosby and Miami soils. Permeability is slow in the Crosby soil. It is moderate in the upper part of the subsoil in the Miami soil, moderately slow in the lower part of the subsoil, and slow in the underlying material. Surface runoff is medium on both soils. The content of organic matter in the surface layer is moderately low. The Crosby soil has a water table at a depth of 1 to 3 feet in winter and early spring.

Most areas are used for cultivated crops. Some areas are used for hay or pasture, and a few small areas are used as woodland.

These soils are well suited to corn, soybeans, and small grain. Erosion is a hazard. Wetness is a limitation in areas of the Crosby soil. Crusting is also a concern. Subsurface drains can be used to remove excess water in some areas on toe slopes and in drainageways. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, conservation tillage, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion, help to prevent crusting, and maintain or improve tilth, infiltration, aeration, and the content of organic matter. These soils are well suited to no-till and ridge-till tillage systems. They are also well suited to spring moldboard and chisel tillage systems if the new crop is planted into corn residue.

These soils are well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. Erosion is a hazard. Wetness is a limitation in areas of the Crosby soil. Subsurface drains are needed in some areas on toe slopes and in drainageways. Growing grasses and legumes helps to control runoff and erosion. Overgrazing or grazing when the soils are too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use

during wet periods help to keep the pasture in good condition.

These soils are well suited to trees. Plant competition is moderate. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

The wetness is a severe limitation if the Crosby soil is used as a site for dwellings. Installing subsurface drains helps to lower the water table. Constructing buildings on raised, well compacted fill material also helps to overcome the wetness. The shrink-swell potential is a moderate limitation if the Miami soil is used as a site for dwellings. Foundations, footings, and basement walls should be strengthened. Backfilling with coarser material helps to prevent the structural damage caused by shrinking and swelling of the soil. Because of low strength, both soils are severely limited as sites for local roads and streets. The potential for frost action is an additional limitation in areas of the Crosby soil. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soils to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is IIe. The woodland ordination symbol is 4A for the Crosby soil and 5A for the Miami soil.

DmC2—Desker gravelly sandy loam, 6 to 12 percent slopes, eroded. This moderately sloping, well drained soil is on terrace breaks and along drainageways on terraces and outwash plains. It is moderately deep over very gravelly coarse sand. Individual areas are long and narrow or irregularly shaped and range from 2 to 20 acres in size.

Typically, the surface layer is dark brown gravelly sandy loam about 8 inches thick. It contains dark brown material from the subsoil. The subsoil is 19 inches thick. It is dark brown, firm gravelly sandy loam in the upper part and dark brown, friable gravelly coarse sandy loam in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown very gravelly coarse sand. In places very gravelly sand is at a depth of less than 20 inches or more than 40 inches. In a few areas the surface layer is lighter colored. In some places the dark surface layer is more than 10 inches thick.

Included with this soil in mapping are the well drained Carmi soils on the upper part of side slopes. These soils have a solum that is more than 40 inches thick. Also included are the excessively drained Rodman soils on steep breaks, areas of soils that have a cobbly surface layer, and small severely eroded areas that have a surface soil of gravelly sandy clay loam or gravelly clay loam. Included soils make up about 15 percent of the unit.

The available water capacity is low in the Desker soil. Permeability is moderately rapid in the upper part of the solum, rapid in the lower part of the solum, and very rapid in the underlying material. Surface runoff is medium. The content of organic matter in the surface layer is moderately low. The gravelly surface layer hinders tillage.

Most areas of this soil are used for cultivated crops. A few areas are used for hay, pasture, or woodland.

This soil is fairly well suited to corn, soybeans, and small grain. Erosion and droughtiness are the major management concerns. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, conservation tillage, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. Irrigation helps to overcome the droughtiness. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion, reduce the evaporation rate, and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems and to spring chisel systems if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as smooth bromegrass and alfalfa, for hay and pasture. Erosion is a hazard. Growing grasses and legumes helps to control runoff and erosion. Droughtiness is a limitation. Irrigation helps to overcome the droughtiness. Deep-rooted legumes and drought-tolerant species should be selected. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during the summer and during wet periods help to keep the pasture in good condition.

The slope is a moderate limitation if this soil is used as a site for dwellings. The buildings should be designed so that they conform to the natural slope of the land. Because of the slope and the potential for frost action, the soil is moderately limited as a site for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage. Where possible, constructing the roads on the contour reduces the amount of land grading needed to overcome the slope.

The land capability classification is IIIe. No woodland ordination symbol is assigned.

DoC2—Desker sandy loam, kame, 6 to 12 percent slopes, eroded. This moderately sloping, well drained soil is on eskers and kames. It is moderately deep over sand and gravelly coarse sand. Individual areas are irregular in shape and range from 2 to 40 acres in size.

Typically, the surface layer is very dark grayish brown sandy loam about 9 inches thick. It contains dark brown material mixed from the subsoil. The subsoil is 25 inches thick. It is dark brown, friable gravelly sandy loam and friable gravelly coarse sandy loam in the upper part and dark yellowish brown, very friable gravelly loamy coarse sand in the lower part. The underlying material to a depth of 60 inches or more is brown, stratified sand and gravelly coarse sand. In some places glacial till is at a depth of less than 60 inches. In a few areas thin strata ranging from silt loam to sandy loam are in the underlying material. In places the surface layer is silt loam. In some areas, the surface layer is lighter colored or the dark surface layer is 10 or more inches thick.

Included with this soil in mapping are areas of the excessively drained Rodman and well drained Longlois soils. Rodman soils are on shoulder slopes. Longlois soils are on toe slopes. They have more clay in the upper part of the subsoil than the Desker soil and have a solum that is more than 40 inches thick. Also included are small severely eroded areas that have a gravelly surface soil. Included soils make up about 15 percent of the unit.

The available water capacity is low in the Desker soil. Permeability is moderately rapid in the upper part of the solum, rapid in the lower part of the solum, and very rapid in the underlying material. Surface runoff is medium. The content of organic matter in the surface layer is moderately low.

Most areas of this soil are used for cultivated crops. Some areas are used for hay, pasture, or woodland.

This soil is fairly well suited to corn, soybeans, and small grain. Water erosion and soil blowing are major hazards, and droughtiness is the major limitation. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, conservation tillage, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage, planting buffer strips or vegetative barriers, ridging at an angle to the prevailing wind, or using a combination of these practices or by maintaining a permanent cover of vegetation. Irrigation helps to overcome the droughtiness. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control soil blowing and erosion, reduce the evaporation rate, and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems and to spring chisel if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as smooth bromegrass and alfalfa, for hay and pasture. Water erosion and soil blowing are hazards. Growing grasses and legumes helps to control runoff, soil blowing, and erosion. Droughtiness is a limitation. Irrigation helps to overcome the droughtiness. Deep-rooted legumes and drought-tolerant species should be selected. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during the summer and during wet periods help to keep the pasture in good condition.

The slope is a moderate limitation if this soil is used as a site for dwellings. The buildings should be designed so that they conform to the natural slope of the land. Because of the slope and the potential for frost action, the soil is moderately limited as a site for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage. Where possible, constructing the roads on the contour reduces the amount of land grading needed to overcome the slope.

The land capability classification is IIIe. No woodland ordination symbol is assigned.

DpD2—Desker-Rodman complex, kame, 12 to 18 percent slopes, eroded. This map unit consists of strongly sloping soils on eskers, kames, and terraces. The Desker soil is well drained and is on the lower part of slopes. It is moderately deep over sand and gravelly coarse sand. The Rodman soil is excessively drained and is on the shoulders and summits of ridgetops. It is shallow over very gravelly coarse sand and coarse sand. Individual areas of this unit are long and narrow or irregularly shaped and range from 2 to 120 acres in size. They are about 50 percent Desker soil and 30 percent Rodman soil. The two soils occur as areas so intricately mixed that it was not practical to map them separately.

Typically, the surface layer of the Desker soil is very dark grayish brown sandy loam about 9 inches thick. It contains dark brown material from the subsoil. The subsoil is 21 inches thick. It is dark brown, friable

gravelly sandy loam and gravelly coarse sandy loam in the upper part and dark brown, very friable gravelly loamy coarse sand in the lower part. The underlying material to a depth of 60 inches or more is brown, stratified sand and gravelly coarse sand. In a few areas the surface layer is silt loam. In a few places the underlying material has thin strata ranging from silt loam to sandy loam. In places, the surface layer is lighter colored or the dark surface layer is more than 10 inches thick.

Typically, the surface layer of the Rodman soil is very dark grayish brown gravelly sandy loam about 8 inches thick. The subsurface layer is dark brown, very friable gravelly loamy coarse sand about 4 inches thick. The underlying material to a depth of 60 inches or more is brown very gravelly coarse sand that has strata of coarse sand. In a few areas the underlying material is below a depth of 15 inches. In places the surface layer is lighter colored.

Included with these soils in mapping are the well drained Longlois soils on the lower part of side slopes. Longlois soils have more clay in the upper part of the subsoil than the major soils and have a solum that is more than 40 inches thick. Also included are areas of soils that have a very gravelly or cobbly surface layer. Included soils make up about 15 percent of the unit.

The available water capacity is low in the Desker soil and very low in the Rodman soil. Permeability is moderately rapid in the upper part of the solum in the Desker soil, rapid in the lower part of the solum, and very rapid in the underlying material. It is very rapid in the Rodman soil. Surface runoff is rapid on both soils. The content of organic matter in the surface layer is moderately low.

Most areas are used for cultivated crops. Many areas are used for hay or pasture. A few areas are used as woodland.

These soils are poorly suited to corn, soybeans, and small grain. Erosion and droughtiness are the major management concerns. Soil blowing is also a hazard in areas of the Desker soil. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, conservation tillage, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage, planting buffer strips or vegetative barriers, ridging at an angle to the prevailing wind, or using a combination of these practices or by maintaining a permanent cover of vegetation. Irrigation helps to overcome the droughtiness. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control soil blowing and erosion and maintain or improve tilth, infiltration, aeration, and the content of organic matter.

These soils are well suited to grasses and legumes, such as smooth bromegrass and alfalfa, for pasture. They are fairly well suited to hay. Water erosion is a hazard. Soil blowing is an additional concern in areas of the Desker soil. Growing grasses and legumes helps to control runoff, soil blowing, and erosion. Droughtiness is a limitation. Irrigation helps to overcome the droughtiness. Deep-rooted legumes and drought-tolerant species should be selected. Overgrazing or grazing when the soils are too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during the summer and during wet periods help to keep the pasture in good condition.

The Rodman soil is well suited to trees. The main management concern is seedling mortality. Site preparation, special planting stock, and overplanting help to overcome seedling mortality. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of the slope, these soils are generally unsuited to use as sites for dwellings. The buildings should be designed so that they conform to the natural slope of the land. The slope is a severe limitation if the soils are used as sites for local roads and streets. Cuts and fills are needed. Where possible, constructing the roads on the contour helps to overcome the slope.

The land capability classification is IVe. The woodland ordination symbol for the Rodman soil is 4S. No woodland ordination symbol is assigned for the Desker soil.

Du—Drummer soils. These nearly level, very deep, poorly drained soils are in depressions and drainageways on recessional moraines and till plains. They are frequently ponded by surface runoff from adjacent areas. Individual areas of this unit are irregular in shape and range from 2 to more than 1,000 acres in size. They are about 60 percent Drummer soil and 25 percent Drummer soil that has a stratified sandy substratum.

Typically, the surface layer of the Drummer soil is black silty clay loam about 9 inches thick. The subsurface layer is black, firm silty clay loam about 8 inches thick. It is mottled in the lower part. The subsoil is about 53 inches thick. The upper part is grayish brown and light brownish gray, mottled, firm silty clay loam, and the lower part is yellowish brown, mottled, firm silt loam and clay loam. The underlying material to a depth of 80 inches or more is yellowish brown,

mottled loam that has strata of silty clay loam. In places the subsoil contains more clay. In some areas the thickness of the silty material is less than 40 inches or more than 60 inches. In a few small areas, loam or silt loam glacial till is within a depth of 60 inches.

Typically, the surface layer of the Drummer soil that has a stratified sandy substratum is black silty clay loam about 11 inches thick. The subsoil is about 47 inches thick. It is dark gray, firm silty clay loam in the upper part; olive gray, mottled, firm silty clay loam in the next part; and olive gray, mottled, friable sandy loam in the lower part. The underlying material to a depth of 70 inches or more is olive brown, mottled, stratified fine sand and fine sandy loam. In places the subsoil contains more clay. In some areas the thickness of the silty material is less than 40 inches or more than 60 inches. In a few small areas, loam or silt loam glacial till is within a depth of 60 inches.

Included with these soils in mapping are the somewhat poorly drained Brenton, Millbrook, Raub, and Toronto soils. These included soils are in the slightly higher positions on the landscape. They make up about 15 percent of the unit.

The available water capacity is very high in the Drummer soil and high in the Drummer soil that has a stratified sandy substratum. Permeability is moderate in both soils. Surface runoff is very slow or ponded. The content of organic matter in the surface layer is high. The water table is at or above the surface during the winter and spring. The surface layer of both soils becomes cloddy and hard to work if tilled when too wet.

Most areas are used for cultivated crops. A few areas are used for hay or pasture.

These soils are well suited to corn, soybeans, and small grain. Wetness and the ponding are the major management concerns. Crusting is also a concern. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available (fig. 8). Small enclosed depressions can be drained within open inlet pipe in conjunction with subsurface drainage. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve soil tilth, infiltration, aeration, and the content of organic matter. These soils are well suited to fall moldboard, fall chisel, and ridge-till tillage systems. They are also well suited to no-till if the new crop is planted into soybean residue.

These soils are well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. The wetness and the ponding are concerns. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soils are too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

Because of the ponding, these soils are generally unsuited to use as sites for dwellings. Because of low strength, the ponding, and the potential for frost action, the soils are severely limited as sites for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soils to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by ponding and by frost action.

The land capability classification is IIw. No woodland ordination symbol is assigned.

Dy—Du Page loam, frequently flooded. This nearly level, very deep, well drained soil is on flood plains. It is subject to frequent flooding for very brief to long periods during the winter and spring. Individual areas are irregular in shape and range from 5 to 180 acres in size.

Typically, the surface layer is very dark grayish brown loam about 10 inches thick. The subsurface layer is very dark grayish brown and very dark gray, friable loam about 39 inches thick. The underlying material to a depth of 60 inches or more is dark brown sandy loam. In some places the dark surface layer is less than 24 inches thick. In other places the surface layer is silty clay loam or sandy loam. In some areas the underlying material is gravelly sand. In a few areas the surface soil is not calcareous.

Included with this soil in mapping are the well drained Allison and Battleground soils, the somewhat poorly drained Tice soils, and the very poorly drained Sawabash soils in the lower lying areas. Allison and Battleground soils have less sand in the subsoil than the Du Page soil. Included soils make up about 10 percent of the unit.

The available water capacity is high in the Du Page soil. Permeability is moderate. Surface runoff is slow. The content of organic matter in the surface layer is moderate.

Most areas of this soil are used for cultivated crops. A few areas are used for woodland, hay, or pasture.

This soil is well suited to corn and soybeans, but damage from floodwaters can be expected. Flooding is the major management concern. Small grain planted in the fall is subject to severe damage during periods of prolonged flooding. Late spring planting of short-season

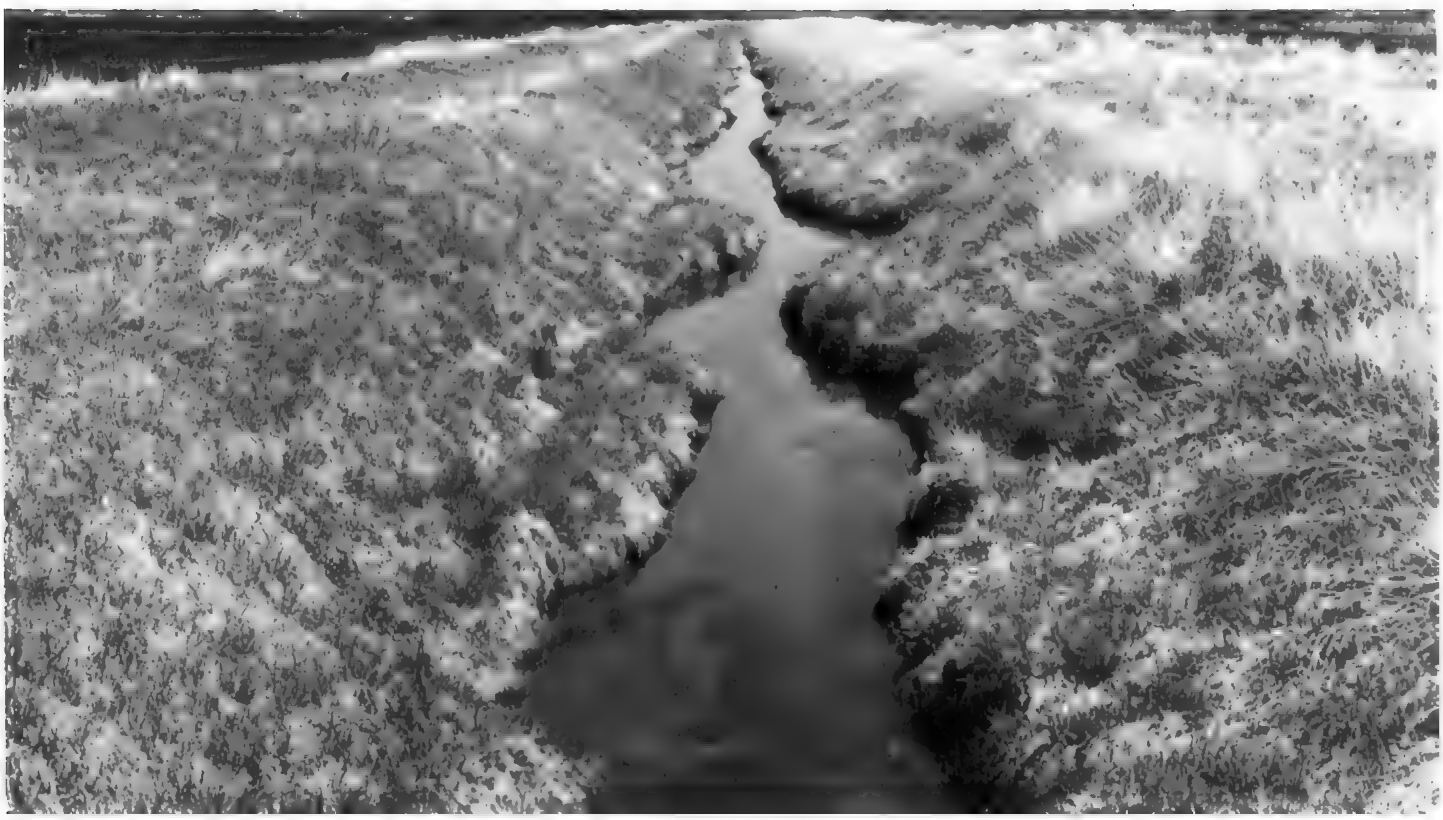

Figure 8.—An open ditch helps to overcome wetness in this area of Drummer soils by providing an outlet for subsurface drains and shallow surface drains.

varieties of adapted crops helps to minimize the damage or loss caused by flooding. Levees and dikes help to control flooding, but they are extremely expensive if properly constructed. Crusting is also a concern. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control scouring by floodwater, help to prevent crusting, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to spring moldboard, spring chisel, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture, but prolonged flooding can damage these crops in winter and spring. Levees and dikes help to control flooding. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

Because of the flooding, this soil is generally unsuited to use as a site for dwellings. The flooding is also a severe limitation on sites for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side

ditches and culverts help to prevent flood damage.

The land capability classification is IIw. No woodland ordination symbol is assigned.

EkA—Elston sandy loam, gravelly substratum, 0 to 2 percent slopes. This nearly level, well drained soil is on terraces and outwash plains. It is deep or very deep over coarse sand and very gravelly coarse sand. Individual areas are irregular in shape and range from 3 to more than 1,000 acres in size.

Typically, the surface layer is very dark gray sandy loam about 10 inches thick. The subsurface layer is very dark gray, friable sandy loam about 4 inches thick. The subsoil is about 35 inches thick. It is dark brown, friable sandy loam in the upper part and dark brown, very friable loamy coarse sand and sand in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown, stratified coarse sand and very gravelly coarse sand. In some places the dark surface layer is less than 10 inches thick. In a few small areas the subsoil contains more gravel or more clay. In some places the surface layer is loamy sand or loam. In some small areas the underlying coarse sand and gravelly coarse sand are at a depth of less than 40 inches.

Included with this soil in mapping are small areas of the well drained Troxel soils in depressions. These soils have more clay and less sand in the subsoil than the Elston soil and have a dark surface layer more than 24 inches thick. Also included are the excessively drained Sparta soils on rises. Included soils make up about 15 percent of the unit.

The available water capacity is low in the Elston soil. Permeability is moderately rapid in the upper part of the solum, rapid in the lower part of the solum, and very rapid in the underlying material. Surface runoff is slow. The content of organic matter in the surface layer is moderate.

Most areas of this soil are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Soil blowing and droughtiness are the major management concerns. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage, planting buffer strips or vegetative barriers, ridging at an angle to the prevailing wind, or using a combination of these practices or by maintaining a permanent cover of vegetation. Irrigation helps to overcome the droughtiness. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control soil blowing, minimize crusting and evaporation, and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems. It is also well suited to fall moldboard and chisel tillage systems if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as smooth bromegrass and alfalfa, for hay and pasture. Soil blowing and droughtiness are concerns. Growing grasses and legumes helps to control soil blowing. Irrigation helps to overcome the droughtiness. Deep-rooted legumes and drought-tolerant species should be selected. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during the summer and during wet periods help to keep the pasture in good condition.

This soil is suited to use as a site for dwellings. Because of the potential for frost action, the soil is moderately limited as a site for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is IIs. No woodland ordination symbol is assigned.

EmA—Elston loam, gravelly substratum, 0 to 2 percent slopes. This nearly level, well drained soil is on terraces and outwash plains. It is deep or very deep over gravelly sand. Individual areas are irregular in shape and range from 3 to more than 1,000 acres in size.

Typically, the surface layer is very dark brown loam about 9 inches thick. The subsurface layer is very dark grayish brown, friable loam about 5 inches thick. The subsoil is about 44 inches thick. It is dark yellowish brown and dark brown, friable loam and sandy loam in the upper part and dark brown, very friable loamy sand in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown gravelly sand. In some areas the dark surface layer is less than 10 inches thick. In places the subsoil contains more clay and gravel. In some small areas the underlying gravelly sand is at a depth of less than 40 inches. In a few small areas the surface layer is sandy loam.

Included with this soil in mapping are areas of the well drained Troxel soils in depressions. These soils have more clay and less sand in the subsoil than the Elston soil and have a dark surface layer more than 24 inches thick. Also included are the excessively drained Sparta soils on rises. Included soils make up about 5 percent of the unit.

The available water capacity is moderate in the Elston soil. Permeability is moderately rapid in the upper part of the solum, rapid in the lower part of the solum, and very rapid in the underlying material. Surface runoff is slow. The content of organic matter

in the surface layer is moderate.

Most areas of this soil are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Droughtiness is a limitation. Crusting is also a concern. Irrigation helps to overcome the droughtiness. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops minimize crusting, reduce the evaporation rate, and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to moldboard, chisel, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as smooth bromegrass and alfalfa, for hay and pasture. Droughtiness is a limitation. Irrigation helps to overcome the droughtiness. Deep-rooted legumes and drought-tolerant species should be selected. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during the summer and during wet periods help to keep the pasture in good condition.

This soil is suited to use as a site for dwellings. Because of the potential for frost action, the soil is moderately limited as a site for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is IIs. No woodland ordination symbol is assigned.

FcB—Fincastle-Crosby complex, 1 to 3 percent slopes. This map unit consists of nearly level and gently sloping, somewhat poorly drained soils on till plains. The Fincastle soil is generally in the more level areas. It is deep over compact glacial till. The Crosby soil is on the higher lying swells and in the more sloping areas along drainageways. It is moderately deep over compact glacial till. Individual areas of this unit are irregular in shape and range from 3 to more than 1,000 acres in size. They are about 55 percent Fincastle soil and 30 percent Crosby soil. The two soils occur as areas so intricately mixed that it was not practical to map them separately.

Typically, the surface layer of the Fincastle soil is dark brown silt loam about 8 inches thick. The subsoil is about 34 inches thick. It is brown and grayish brown, mottled, firm silty clay loam in the upper part and light brownish gray, mottled, firm silty clay loam and loam in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown, mottled loam. In places the surface layer is darker. In some areas the subsoil contains more clay. In a few small areas the soil has more than 40 inches of silty material.

Typically, the surface layer of the Crosby soil is dark brown silt loam about 9 inches thick. The subsoil is about 29 inches thick. It is grayish brown and brown, mottled, firm silty clay loam in the upper part; light olive brown, mottled, firm clay loam in the next part; and yellowish brown, mottled, firm loam in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown, mottled loam. In places the upper part of the subsoil contains more sand. In some areas the surface layer is darker.

Included with these soils in mapping are the very poorly drained Mahalasville and Treaty soils in depressions and drainageways and the well drained Miami soils and some moderately well drained soils on slight rises and in the more sloping areas along drainageways. Also included are areas of the somewhat poorly drained Starks soils in landscape positions similar to those of the Fincastle soil. Starks soils are underlain by stratified material. Included soils make up about 15 percent of the unit.

The available water capacity is high in the Fincastle and Crosby soils. Permeability is moderate in the upper part of the solum in the Fincastle soil, moderately slow in the lower part of the solum, and slow in the underlying material. It is slow in the Crosby soil. Surface runoff is medium on both soils. The content of organic matter in the surface layer is moderately low. Both soils have a high water table at a depth of 1 to 3 feet in winter and early spring.

Most areas are used for cultivated crops. Some areas are used for hay or pasture. A few small areas are used as woodland.

These soils are well suited to corn, soybeans, and small grain. Wetness and erosion are the major management concerns. Crusting is also a concern. Subsurface drains can be used to remove excess water if adequate outlets are available. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, conservation tillage, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion, help to prevent crusting, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. These soils are well suited to no-till and ridge-till tillage systems. They are also well suited to spring moldboard and chisel tillage systems if the new crop is planted into corn residue.

These soils are well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay

and pasture. The wetness and the hazard of erosion are concerns. Subsurface drains can be used to remove excess water if adequate outlets are available. Growing grasses and legumes helps to control runoff and erosion. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soils are too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

These soils are well suited to trees. Plant competition is moderate. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

The wetness is a severe limitation if these soils are used as sites for dwellings. Installing subsurface drains helps to lower the water table. Constructing buildings on raised, well compacted fill material also helps to overcome the wetness. Because of low strength and the potential for frost action, the soils are severely limited as sites for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soils to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is IIe. The woodland ordination symbol is 4A.

Hd—Harpster silt loam, pothole. This nearly level, very deep, very poorly drained soil is in depressions on outwash plains. It is frequently ponded by surface runoff from adjacent areas. Individual areas are irregular in shape and range from 5 to 30 acres in size.

Typically, the surface layer is black silt loam about 11 inches thick. The subsoil is about 19 inches thick. It is dark gray, friable silt loam in the upper part and dark grayish brown, firm silty clay loam in the lower part. The underlying material to a depth of 60 inches or more is gray silt loam. In a few places the surface layer is mucky.

Included with this soil in mapping are small areas of the very poorly drained Pella soils and Mahalasville soils that have a gravelly substratum. These soils are in the slightly higher positions at the edges of deep depressions. They are not calcareous in the upper part of the subsoil. They make up about 10 percent of the unit.

The available water capacity is very high in the Harpster soil. Permeability is moderate. Surface runoff is very slow or ponded. The content of organic matter in the surface layer is high. The water table is at or above the surface, mainly during the winter and spring. The surface layer is calcareous and has a high pH. These conditions may affect the uptake of plant nutrients.

Most areas of this soil are used for cultivated crops. A few areas are used for hay or pasture.

This soil is poorly suited to corn and soybeans. Wetness and the ponding are the major management concerns. Crusting is also a concern. Small grain planted in the fall is subject to severe damage during periods of prolonged ponding. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to fall moldboard, fall chisel, and ridge-till tillage systems. It is also well suited to no-till if the new crop is planted into soybean residue.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for pasture. It is fairly well suited to hay. The wetness and the ponding are concerns. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

Because of the ponding, this soil is generally unsuited to use as a site for dwellings. Because of low strength, ponding, and the potential for frost action, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by ponding and by frost action.

The land capability classification is IVw. No woodland ordination symbol is assigned.

HfB2—High Gap Variant silt loam, 1 to 6 percent slopes, eroded. This nearly level and gently sloping, moderately well drained soil is in undulating areas and along drainageways on uplands. It is moderately deep

over interbedded siltstone and shale bedrock. Individual areas are irregular in shape and range from 3 to 60 acres in size.

Typically, the surface layer is dark brown silt loam about 9 inches thick. It contains dark yellowish brown material from the subsoil. The subsoil is about 27 inches thick. It is dark yellowish brown, firm silt loam in the upper part; dark brown, firm clay loam in the next part; and dark yellowish brown, mottled, firm channery clay loam in the lower part. Below this to a depth of 60 inches or more is interbedded siltstone and shale bedrock. In some places the surface layer is darker. In a few areas the underlying bedrock is at a depth of more than 40 inches or less than 20 inches. In the northeastern part of the county, the bedrock is New Albany shale.

Included with this soil in mapping are small areas of the somewhat poorly drained Shadeland soils in the more level areas and in drainageways. Also included, in depressions and drainageways, are a few areas of the very poorly drained Mahalasville soils that have a shale substratum. Included soils make up about 15 percent of the unit.

The available water capacity is moderate in the High Gap Variant soil. Permeability is moderate in the upper part of the solum and moderately slow in the lower part. Surface runoff is medium. The content of organic matter in the surface layer is moderately low. The water table is at a depth of 2.0 to 3.5 feet, mainly in winter and spring.

Most areas of this soil are used for cultivated crops, hay, or pasture. Many areas are used as woodland.

This soil is well suited to corn, soybeans, and small grain. Erosion is a hazard. Crusting is also a concern. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, conservation tillage, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion, help to prevent crusting, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems. It is also well suited to fall moldboard and chisel tillage systems if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Erosion is a hazard. Growing grasses and legumes helps to control runoff and erosion. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is moderate. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Wetness and the shrink-swell potential are moderate limitations if this soil is used as a site for dwellings without basements. Because of the wetness, the soil is severely limited as a site for dwellings with basements. Installing subsurface drains helps to lower the water table. Constructing buildings on raised, well compacted fill material also helps to overcome the wetness. Foundations and footings should be strengthened. Backfilling with coarser material helps to prevent the structural damage caused by shrinking and swelling of the soil. Because of low strength, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic.

The land capability classification is IIe. The woodland ordination symbol is 6A.

HfC2—High Gap Variant silt loam, 6 to 12 percent slopes, eroded. This moderately sloping, moderately well drained soil is in undulating areas and along drainageways on uplands. It is moderately deep over interbedded siltstone and shale bedrock. Individual areas are long and narrow or irregularly shaped and range from 2 to 20 acres in size.

Typically, the surface layer is dark brown silt loam about 8 inches thick. It contains dark yellowish brown material from the subsoil. The subsoil is about 26 inches thick. It is dark yellowish brown, firm silty clay loam in the upper part; dark brown, firm clay loam in the next part; and dark yellowish brown, mottled, firm channery clay loam in the lower part. Below this to a depth of 60 inches or more is interbedded siltstone and shale bedrock. In some areas the underlying bedrock is at a depth of more than 40 inches or less than 20 inches. In a few areas the surface layer is darker. In the northeastern part of the county, the bedrock is New Albany shale.

Included with this soil in mapping are areas of the somewhat poorly drained Shadeland soils on toe slopes and in drainageways; areas of the well drained Berks soils and bedrock escarpments where the slope is more than 12 percent, adjacent to drainageways and narrow flood plains; and small severely eroded areas where the surface soil is silty clay loam or clay loam. Included areas make up about 15 percent of the unit.

The available water capacity is low in the High Gap Variant soil. Permeability is moderate in the upper part of the solum and moderately slow in the lower part. Surface runoff is medium. The content of organic matter in the surface layer is moderately low. The water table is at a depth of 2.0 to 3.5 feet, mainly in winter and spring.

Most areas of this soil are used for cultivated crops, hay, or pasture. Many areas are used as woodland.

This soil is fairly well suited to corn, soybeans, and small grain. Erosion is the major hazard. Crusting is also a concern. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, conservation tillage, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion, help to prevent crusting, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems. It is also well suited to spring chisel if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Erosion is a hazard. Growing grasses and legumes helps to control runoff and erosion. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is moderate. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Wetness, the shrink-swell potential, and the slope are moderate limitations if this soil is used as a site for dwellings without basements. The wetness is a severe limitation on sites for dwellings with basements. Installing subsurface drains helps to lower the water table. Constructing buildings on raised, well compacted fill material also helps to overcome the wetness. Foundations and footings should be strengthened. Backfilling with coarser material helps to prevent the structural damage caused by shrinking and swelling of the soil. The buildings should be designed so that they conform to the natural slope of the land. Because of low strength, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads with a more suitable material improves the ability of the soil to support vehicular traffic.

The land capability classification is IIIe. The woodland ordination symbol is 6A.

HnB—Hononegah loamy sand, 2 to 6 percent slopes. This gently sloping, excessively drained soil is on rises and breaks on stream terraces. It is moderately deep or deep over very gravelly coarse sand. Individual areas are elongated or irregularly shaped and range from 2 to 10 acres in size.

Typically, the surface layer is very dark grayish brown loamy sand about 10 inches thick. The subsoil is about 24 inches thick. It is dark brown, very friable loamy sand and gravelly loamy sand. The underlying material to a depth of 60 inches or more is yellowish brown very gravelly coarse sand. In places the upper part of the subsoil contains more gravel. In some areas the underlying very gravelly coarse sand is at a depth of less than 30 inches. In a few places the surface layer is less than 10 inches thick.

Included with this soil in mapping are small areas of the excessively drained Rodman and well drained Strawn soils on the steeper breaks. Rodman soils have a solum that is less than 15 inches thick. Also included, on toe slopes, are the somewhat poorly drained Sleeth soils and the very poorly drained Mahalasville soils that have a gravelly substratum. Included soils make up about 15 percent of the unit.

The available water capacity is low in the Hononegah soil. Permeability is rapid in the solum and very rapid in the underlying material. Surface runoff is slow. The content of organic matter in the surface layer is moderately low.

Most areas of this soil are used for cultivated crops. Some areas are used for hay, pasture, or woodland.

This soil is poorly suited to corn, soybeans, and small grain. Water erosion and soil blowing are hazards, and droughtiness is a limitation. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, conservation tillage, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage, planting buffer strips or vegetative barriers, ridging at an angle to the prevailing wind, or using a combination of these practices or by maintaining a permanent cover of vegetation. Irrigation helps to overcome the droughtiness. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion and soil blowing, reduce the evaporation rate, and maintain or improve tilth,

infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems. It is also well suited to spring chisel if the new crop is planted into corn residue.

This soil is fairly well suited to grasses and legumes, such as smooth bromegrass and alfalfa, for hay. It is well suited to pasture. Water erosion and soil blowing are hazards, and droughtiness is a limitation. Irrigation helps to overcome the droughtiness. Deep-rooted legumes and drought-tolerant species should be selected. Growing grasses and legumes helps to control runoff, soil blowing, and water erosion. Overgrazing reduces plant densities. Proper stocking rates, rotation grazing, and restricted use during the summer help to keep the pasture in good condition.

This soil is suitable for use as a site for dwellings and local roads and streets.

The land capability classification is IVs. No woodland ordination symbol is assigned.

HoA—Hononegah fine sandy loam, 0 to 2 percent slopes. This nearly level, excessively drained soil is on stream terraces. It is moderately deep or deep over very gravelly coarse sand. Individual areas are irregular in shape and range from 2 to 100 acres in size.

Typically, the surface layer is very dark grayish brown fine sandy loam about 11 inches thick. The subsoil is about 34 inches thick. It is dark yellowish brown and dark brown, very friable fine sandy loam and loamy sand in the upper part and dark brown, very friable gravelly loamy sand and gravelly sand in the lower part. The underlying material to a depth of 60 inches or more is brown very gravelly coarse sand. In places the dark surface layer is less than 10 inches thick or is lighter colored. In a few small areas the surface layer and the upper part of the subsoil contain more gravel. In some places the underlying gravelly material is at a depth of more than 50 inches or less than 30 inches.

Included with this soil in mapping are the excessively drained Rodman and well drained Strawn soils on the steeper terrace breaks. Rodman soils have a solum that is less than 15 inches thick. Also included, in the lower lying areas and in depressions, are the somewhat poorly drained Sleeth soils and the very poorly drained Mahalasville soils that have a gravelly substratum. Included soils make up about 15 percent of the unit.

The available water capacity is low in the Hononegah soil. Permeability is rapid in the solum and very rapid in the underlying material. Surface runoff is slow. The content of organic matter in the surface layer is moderately low.

Most areas of this soil are used for cultivated crops. A few areas are used for hay, pasture, or woodland.

This soil is poorly suited to corn, soybeans, and small grain. Droughtiness is a limitation, and soil blowing is a hazard. Irrigation helps to overcome the droughtiness. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage, planting buffer strips or vegetative barriers, ridging at an angle to the prevailing wind, or using a combination of these practices or by maintaining a permanent cover of vegetation. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control soil blowing, reduce the evaporation rate, and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems. It is also well suited to spring chisel if the new crop is planted into corn residue.

This soil is fairly well suited to grasses and legumes, such as smooth bromegrass and alfalfa, for hay. It is well suited to pasture. Droughtiness is a limitation, and soil blowing is a hazard. Irrigation helps to overcome the droughtiness. Deep-rooted legumes and drought-tolerant species should be selected. Growing grasses and legumes helps to control soil blowing. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during the summer and during wet periods help to keep the pasture in good condition.

This soil is suitable for use as a site for dwellings and local roads and streets.

The land capability classification is IVs. No woodland ordination symbol is assigned.

Hv—Houghton muck, undrained. This nearly level, very deep, very poorly drained soil is in depressions on outwash plains, terraces, recessional moraines, and till plains. It is frequently ponded by surface runoff from adjacent areas. Individual areas are irregular in shape and range from 2 to 90 acres in size.

Typically, the surface layer is black muck about 6 inches thick. Below this to a depth of 60 inches or more is friable muck. It is black in the upper part and dark reddish brown in the lower part. In some places the soil has layers of fibers that are not as well decomposed. In other places overwash mineral material has been mixed with the surface layer. In a few small areas either mineral material or coprogenous earth is within a depth of 50 inches.

Included with this soil in mapping are the very poorly drained Mahalasville, Treaty, and Pella soils and the poorly drained Drummer soils in the slightly higher positions at the edges of deep depressions. These soils

formed in mineral material. They make up about 15 percent of the unit.

The available water capacity is very high in the Houghton soil. Permeability ranges from moderately slow to moderately rapid. Surface runoff is very slow or ponded. The content of organic matter in the surface layer is very high. The water table is at or above the surface during the winter and spring.

Most areas of this soil have not been drained. They are idle land or are used as wildlife habitat. A few areas are used for pasture.

This soil is generally unsuited to cultivated crops and hay and is poorly suited to pasture. Wetness and the ponding are the major limitations.

This soil is poorly suited to trees. The main management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. The equipment limitation is caused by wetness. The wetness can be overcome by performing woodland management activities during periods when the soil is relatively dry or is frozen. Site preparation, special planting stock, and overstocking help to overcome seedling mortality. Species that tolerate wetness should be planted. Using harvest methods that do not leave the remaining trees isolated or widely spaced helps to overcome the windthrow hazard. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of the ponding and subsidence, this soil is generally unsuited to use as a site for dwellings. Because of the subsidence, the ponding, and the potential for frost action, the soil is severely limited as a site for local roads and streets. Replacing the organic material with a more suitable base material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by ponding and by frost action.

The land capability classification is Vw. The woodland ordination symbol is 2W.

KaA—Kalamazoo loam, 0 to 2 percent slopes. This nearly level, well drained soil is on outwash plains and stream terraces. It is deep or very deep over coarse sand and very gravelly coarse sand. Individual areas are irregular in shape and range from 2 to 700 acres in size.

Typically, the surface layer is brown loam about 11 inches thick. The subsoil is about 50 inches thick. It is brown, firm loam in the upper part; brown, firm sandy clay loam in the next part; and dark brown, friable loamy coarse sand in the lower part. The underlying material to a depth of 70 inches or more is yellowish brown, stratified very gravelly coarse sand and coarse sand. In some places the surface layer is darker. In a few areas the lower part of the subsoil has more clay.

Included with this soil in mapping are the moderately well drained Thackery soils in drainageways and at the lower elevations. Also included are small areas of the excessively drained Rodman and well drained Kosciusko soils in the steeper areas along terrace breaks and drainageways. Kosciusko soils have a solum that is less than 40 inches thick. Included soils make up about 10 percent of the unit.

The available water capacity is moderate in the Kalamazoo soil. Permeability is moderate in the upper part of the solum, rapid in the lower part of the solum, and very rapid in the underlying material. Surface runoff is slow. The content of organic matter in the surface layer is moderately low.

Most areas of this soil are used for cultivated crops. A few areas are used for hay, pasture, or woodland.

This soil is well suited to corn, soybeans, and small grain. Droughtiness is a limitation. Crusting is also a concern. Irrigation helps to overcome the droughtiness. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops minimize crusting and evaporation and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to moldboard, chisel, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as smooth bromegrass and alfalfa, for hay and pasture. Droughtiness is a limitation. Irrigation helps to overcome the droughtiness. Deep-rooted legumes and drought-tolerant species should be selected. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during the summer and during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is moderate. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

This soil is suitable for use as a site for dwellings and local roads and streets.

The land capability classification is IIs. The woodland ordination symbol is 4A.

KaB2—Kalamazoo loam, 2 to 6 percent slopes, eroded. This gently sloping, well drained soil is on breaks and along drainageways on outwash plains and stream terraces. It is deep or very deep over coarse

sand and gravelly coarse sand. Individual areas are irregular in shape and range from 2 to 80 acres in size.

Typically, the surface layer is dark brown loam about 10 inches thick. It contains dark brown material from the subsoil. The subsoil is about 51 inches thick. It is dark brown, firm clay loam and gravelly sandy clay loam in the upper part; dark brown, friable gravelly sandy loam and loamy sand in the next part; and dark brown, very friable gravelly loamy sand and loamy sand in the lower part. The underlying material to a depth of 70 inches or more is yellowish brown, stratified coarse sand and gravelly coarse sand. In a few areas the lower part of the subsoil has more clay. In places the surface layer is darker.

Included with this soil in mapping are the moderately well drained Thackery soils in drainageways and on toe slopes and small areas of the excessively drained Rodman and well drained Kosciusko soils in the steeper areas along terrace breaks and drainageways. Kosciusko soils have a solum that is less than 40 inches thick. Also included are small severely eroded areas that have a surface soil of clay loam or that have gravelly textures. Included soils make up about 10 percent of the unit.

The available water capacity is moderate in the Kalamazoo soil. Permeability is moderate in the upper part of the solum, rapid in the lower part of the solum, and very rapid in the underlying material. Surface runoff is medium. The content of organic matter in the surface layer is moderately low.

Most areas of this soil are used for cultivated crops. Some areas are used for hay, pasture, or woodland.

This soil is well suited to corn, soybeans, and small grain. Erosion is a hazard, and droughtiness is a limitation. Crusting is also a concern. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, conservation tillage, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. Irrigation helps to overcome the droughtiness. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion, minimize crusting and evaporation, and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as smooth bromegrass and alfalfa, for hay and pasture. Erosion is a hazard. Growing grasses and legumes helps to control runoff and erosion. Droughtiness is a limitation. Irrigation helps to overcome the droughtiness. Deep-rooted legumes and drought-tolerant species should be selected. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during the summer and during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is moderate. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

This soil is suitable for use as a site for dwellings and for local roads and streets.

The land capability classification is IIe. The woodland ordination symbol is 4A.

KbB2—Kalamazoo silt loam, 2 to 6 percent slopes, eroded. This gently sloping, well drained soil is on breaks and along drainageways on outwash plains and stream terraces. It is deep or very deep over very gravelly coarse sand. Individual areas are irregular in shape and range from 2 to 60 acres in size.

Typically, the surface layer is brown silt loam about 9 inches thick. The subsoil is about 37 inches thick. It is dark yellowish brown, firm silty clay loam and clay loam in the upper part; brown, firm clay loam and sandy clay loam in the next part; and dark brown, friable gravelly loamy sand in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown very gravelly coarse sand. In some places the surface layer is darker. In a few small areas the lower part of the subsoil has more clay.

Included with this soil in mapping are small areas of the moderately well drained Thackery soils on toe slopes. Also included are the well drained Kosciusko and excessively drained Rodman soils in the steeper areas along terrace breaks and drainageways. Kosciusko soils have a solum that is less than 40 inches thick. Included soils make up about 15 percent of the unit.

The available water capacity is moderate in the Kalamazoo soil. Permeability is moderate in the upper part of the solum, rapid in the lower part of the solum, and very rapid in the underlying material. Surface runoff is medium. The content of organic matter in the surface layer is moderately low.

Most areas of this soil are used for cultivated crops. A few areas are used for hay, pasture, or woodland.

This soil is well suited to corn, soybeans, and small grain. Erosion is a hazard, and droughtiness is a limitation. Crusting is also a concern. Erosion and runoff can be controlled by diversions, terraces, water- and sediment-control basins, conservation tillage, cover crops, green manure crops, grade-stabilization

structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. Irrigation helps to overcome the droughtiness. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion, minimize crusting and evaporation, and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems. It is also well suited to spring moldboard and chisel tillage systems if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as smooth bromegrass and alfalfa, for hay and pasture. Erosion is a hazard. Growing grasses and legumes helps to control runoff and erosion. Droughtiness is a limitation. Irrigation helps to overcome the droughtiness. Deep-rooted legumes and drought-tolerant species should be selected. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during the summer and during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is moderate. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

This soil is suitable for use as a site for dwellings and local roads and streets.

The land capability classification is IIe. The woodland ordination symbol is 4A.

KcB2—Kalamazoo silt loam, kame, 2 to 6 percent slopes, eroded. This gently sloping, well drained soil is on kames. It is deep or very deep over sand and gravelly sand. Individual areas are irregular in shape and range from 2 to 80 acres in size.

Typically, the surface layer is brown silt loam about 8 inches thick. It contains dark brown material from the subsoil. The subsoil is about 44 inches thick. It is dark brown, firm clay loam and sandy clay loam in the upper part and strong brown, friable loamy sand in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown, stratified sand and gravelly sand. In some places glacial till is at a depth of less than 60 inches. In a few areas the lower part of the subsoil has more clay. In places the surface layer is darker. In many areas the underlying material has thin strata ranging from silt loam to sandy loam.

Included with this soil in mapping are the well drained Kosciusko soils in the more sloping areas and at the summit of narrow ridges. These soils have a solum that is less than 40 inches thick. Also included are small severely eroded areas that have a surface soil of silty clay loam or clay loam or that have gravelly textures. Included soils make up about 15 percent of the unit.

The available water capacity is high in the Kalamazoo soil. Permeability is moderate in the upper part of the solum, rapid in the lower part of the solum, and very rapid in the underlying material. Surface runoff is medium. The content of organic matter in the surface layer is moderately low.

Most areas of this soil are used for cultivated crops. Some areas are used for hay, pasture, or woodland.

This soil is well suited to corn, soybeans, and small grain. Erosion is a hazard. Crusting is also a concern. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, conservation tillage, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion, help to prevent crusting, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems. It is also well suited to spring moldboard and chisel tillage systems if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Erosion is a hazard. Growing grasses and legumes helps to control runoff and erosion. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is moderate. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

This soil is suitable for use as a site for dwellings and local roads and streets.

The land capability classification is IIe. The woodland ordination symbol is 4A.

KcC2—Kalamazoo silt loam, kame, 6 to 12 percent slopes, eroded. This moderately sloping, well drained soil is on kames. It is deep or very deep over sand and gravelly sand. Individual areas are irregular in shape and range from 2 to 80 acres in size.

Typically, the surface layer is brown silt loam about 8

inches thick. It contains dark yellowish brown material from the subsoil. The subsoil is about 37 inches thick. It is dark yellowish brown, firm silty clay loam in the upper part; dark brown, firm clay loam in the next part; and dark brown, very friable gravelly loamy sand in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown, stratified sand and gravelly sand. In some places glacial till is at a depth of less than 60 inches. In a few areas the lower part of the subsoil has more clay. In places the surface layer is darker. In many areas the underlying material has thin strata ranging from silt loam to sandy loam.

Included with this soil in mapping are the well drained Kosciusko soils near the summit of narrow ridges and in the more sloping areas. These soils have a solum that is less than 40 inches thick. Also included are small severely eroded areas that have a surface soil of silty clay loam or clay loam or that are gravelly. Included soils make up about 15 percent of the unit.

The available water capacity is moderate in the Kalamazoo soil. Permeability is moderate in the upper part of the solum, rapid in the lower part of the solum, and very rapid in the underlying material. Surface runoff is medium. The content of organic matter in the surface layer is moderately low.

Most areas of this soil are used for hay or pasture. Some areas are used for cultivated crops or as woodland.

This soil is fairly well suited to corn, soybeans, and small grain. Erosion is a hazard. Crusting is also a concern. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, conservation tillage, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion, help to prevent crusting, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems. It is also well suited to spring chisel if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Erosion is a hazard. Growing grasses and legumes helps to control runoff and erosion. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is moderate. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

The slope is a moderate limitation if this soil is used as a site for dwellings. The buildings should be designed so that they conform to the natural slope of the land. The slope is also a moderate limitation on sites for local roads and streets. Where possible, constructing the roads on the contour reduces the amount of land grading needed to overcome the slope. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic.

The land capability classification is IIIe. The woodland ordination symbol is 4A.

KoD2—Kosciusko sandy loam, 12 to 18 percent slopes, eroded. This strongly sloping, well drained soil is on eskers, terraces, outwash plains, and kames. It is moderately deep over sand and very gravelly sand. Individual areas are irregular in shape and range from 2 to 30 acres in size.

Typically, the surface layer is very dark gray sandy loam about 5 inches thick. The subsoil is 22 inches thick. It is dark brown, firm gravelly sandy clay loam in the upper part and dark brown, friable very gravelly sandy loam in the lower part. The underlying material to a depth of 60 inches or more is brown, stratified sand and very gravelly sand. In places sand and very gravelly sand are at a depth of less than 24 inches or more than 40 inches. In a few areas the upper part of the subsoil contains less gravel. In many places the soil contains thin strata ranging from silt loam to sandy loam. In some areas the surface layer is dark and is thicker.

Included with this soil in mapping are the well drained Kalamazoo soils in the more level areas and on toe slopes. These soils have a solum that is more than 40 inches thick. Also included are soils that have a gravelly or cobbly surface layer. Included soils make up about 15 percent of the unit.

The available water capacity is low in the Kosciusko soil. Permeability is moderate in the solum and very rapid in the underlying material. Surface runoff is rapid. The content of organic matter in the surface layer is moderately low.

Most areas of this soil are used for woodland, hay, or pasture. A few areas are used for cultivated crops.

This soil is poorly suited to corn, soybeans, and small grain. Water erosion and soil blowing are the major hazards, and droughtiness is the major limitation. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control

basins, conservation tillage, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage, planting buffer strips or vegetative barriers, ridging at an angle to the prevailing wind, or using a combination of these practices or by maintaining a permanent cover of vegetation. Irrigation helps to overcome the droughtiness. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion and soil blowing, reduce the evaporation rate, and maintain or improve tilth, infiltration, aeration, and the content of organic matter.

This soil is well suited to grasses and legumes, such as smooth bromegrass and alfalfa, for pasture. It is fairly well suited to hay. Erosion is a hazard. Growing grasses and legumes helps to control runoff and erosion. Droughtiness is a limitation. Irrigation helps to overcome the droughtiness. Deep-rooted legumes and drought-tolerant species should be selected. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during the summer and during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. The main management concerns are seedling mortality and plant competition. Site preparation, special planting stock, and overstocking help to overcome seedling mortality. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

The slope is a severe limitation if this soil is used as a site for dwellings. The buildings should be designed so that they conform to the natural slope of the land. The slope is also a severe limitation on sites for local roads and streets. Cuts and fills are needed. Where possible, constructing the roads on the contour helps to overcome the slope.

The land capability classification is IVe. The woodland ordination symbol is 4S.

KpC3—Kosciusko gravelly sandy clay loam, 6 to 12 percent slopes, severely eroded. This moderately sloping, well drained soil is on terrace breaks and along drainageways on terraces and outwash plains. It is moderately deep over sand and very gravelly sand. In most areas, the original dark surface layer has been removed by erosion and tillage has mixed the rest with the upper part of the subsoil. Individual areas of this soil are long and narrow or irregularly shaped and range from 2 to 20 acres in size.

Typically, the surface layer is brown gravelly sandy clay loam about 8 inches thick. The subsoil is 19 inches thick. It is dark brown, firm gravelly sandy clay loam in the upper part and dark brown, firm gravelly sandy loam in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown, stratified sand and very gravelly sand. In places sand and very gravelly sand are at a depth of less than 24 inches or more than 40 inches. In a few areas the surface layer and the upper part of the subsoil have less gravel. In some places the surface layer is darker.

Included with this soil in mapping are the well drained Kalamazoo soils in the more level areas. These soils have a solum that is more than 40 inches thick. Also included are areas of soils that have a cobbly surface layer. Included soils make up about 15 percent of the unit.

The available water capacity is low in the Kosciusko soil. Permeability is moderate in the solum and very rapid in the underlying material. Surface runoff is medium. The content of organic matter in the surface layer is moderately low. The gravelly surface layer makes tillage difficult. Also, the surface layer becomes cloddy and hard to work if tilled when too wet.

Most areas of this soil are used for cultivated crops. A few areas are used for hay, pasture, or woodland.

This soil is poorly suited to corn, soybeans, and small grain. Erosion and droughtiness are the major management concerns. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, conservation tillage, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. Irrigation helps to overcome the droughtiness. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion, reduce the evaporation rate, and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems. It is also well suited to spring chisel if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as smooth bromegrass and alfalfa, for pasture. It is fairly well suited to hay. Erosion is a hazard. Growing grasses and legumes helps to control runoff and erosion. Droughtiness is a limitation. Irrigation helps to overcome the droughtiness. Deep-rooted legumes and drought-tolerant species should be selected. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce

plant densities. Proper stocking rates, rotation grazing, and restricted use during the summer and during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is moderate. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

The slope is a moderate limitation if this soil is used as a site for dwellings. The buildings should be designed so that they conform to the natural slope of the land. Because of the slope and the potential for frost action, the soil is moderately limited as a site for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage. Where possible, constructing the roads on the contour reduces the amount of land grading needed to overcome the slope.

The land capability classification is IVe. The woodland ordination symbol is 4A.

LaA—Lafayette silt loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on outwash plains. It is deep or very deep over gravelly coarse sand. Individual areas are irregular in shape and range from 2 to 200 acres in size.

Typically, the surface layer is very dark gray silt loam about 10 inches thick. The subsurface layer is very dark gray, friable silt loam about 3 inches thick. The subsoil is about 52 inches thick. It is brown, dark yellowish brown, and yellowish brown, mottled, firm silt loam and silty clay loam in the upper part; grayish brown and dark grayish brown, mottled, friable sandy loam and loamy coarse sand in the next part; and dark grayish brown, mottled, firm gravelly sandy loam in the lower part. The underlying material to a depth of 70 inches or more is brown gravelly coarse sand. In some places the dark surface layer is less than 10 inches thick. In a few small areas the silty material is less than 24 inches or more than 40 inches thick.

Included with this soil in mapping are the moderately well drained and well drained Waupecan soils, the moderately well drained Bowes Variant soils, and the well drained Bowes soils in the slightly higher areas. Also included, in depressions, are the very poorly drained Mahalasville soils that have a gravelly substratum. Included soils make up about 15 percent of the unit.

The available water capacity is high in the Lafayette soil. Permeability is moderate in the solum and very rapid in the underlying material. Surface runoff is slow. The content of organic matter in the surface layer is moderate. The water table is at a depth of 1 to 3 feet in winter and spring.

Most areas of this soil are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Wetness is a major limitation. Crusting is also a concern. Subsurface drains can be used to remove excess water if adequate outlets are available. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to moldboard, fall chisel, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. Wetness is a limitation. Subsurface drains can be used to remove excess water if adequate outlets are available. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

The wetness is a severe limitation if this soil is used as a site for dwellings. Installing subsurface drains helps to lower the water table. Constructing buildings on raised, well compacted fill material also helps to overcome the wetness. Because of low strength and the potential for frost action, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is IIw. No woodland ordination symbol is assigned.

LeA—La Hogue loam, till substratum, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on till plains. It is deep over compact glacial till. Individual areas are irregular in shape and range from 2 to 40 acres in size.

Typically, the surface layer is very dark gray loam about 10 inches thick. The subsoil is about 37 inches thick. It is dark brown, mottled, friable loam in the upper part; dark brown and dark grayish brown, mottled, firm clay loam in the next part; and brown, mottled, friable sandy loam and loamy sand in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown loam. In places the dark surface layer

is less than 10 inches thick. In a few small areas the surface layer is silt loam. In some places the subsoil contains less clay and more sand.

Included with this soil in mapping are small areas of the somewhat excessively drained Oakville and well drained Linkville soils and the moderately well drained Billett soils that are moderately wet. These soils are in the slightly higher areas. Also included are the poorly drained Drummer soils in the lower lying areas in depressions. Included soils make up about 5 percent of the unit.

The available water capacity is high in the La Hogue soil. Permeability is moderate in the solum and slow in the underlying material. Surface runoff is slow. The content of organic matter in the surface layer is moderate. The water table is at a depth of 1 to 3 feet in winter and spring.

Most areas of this soil are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Wetness is a major limitation. Crusting is also a concern. Subsurface drains can be used to remove excess water if adequate outlets are available. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve soil tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to moldboard, fall chisel, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. Wetness is a limitation. Subsurface drains can be used to remove excess water if adequate outlets are available. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

The wetness is a severe limitation if this soil is used as a site for dwellings. Installing subsurface drains helps to lower the water table. Constructing buildings on raised, well compacted fill material also helps to overcome the wetness. Because of the potential for frost action, the soil is severely limited as a site for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is IIw. No woodland ordination symbol is assigned.

Lm—Lash silt loam, frequently flooded. This nearly level, very deep, well drained soil is on flood plains. It is subject to frequent flooding for brief or long periods during the winter and spring. Individual areas are irregular in shape and range from 5 to 200 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 10 inches thick. The subsurface layer is very dark grayish brown, friable silt loam about 4 inches thick. The subsoil is about 38 inches thick. It is dark brown, friable silt loam in the upper part and dark brown, friable loam in the lower part. The underlying material to a depth of 60 inches or more is dark brown loamy sand. In places the surface layer is 24 or more inches thick.

Included with this soil in mapping are the well drained Battleground soils in areas farther away from stream channels adjacent to uplands. These soils have more clay and less sand in the subsoil than the Lash soil. Also included, in areas adjacent to stream channels, are the somewhat excessively drained Ouiatenon soils that have a sandy substratum. Included soils make up about 15 percent of the unit.

The available water capacity is high in the Lash soil. Permeability is moderately rapid in the solum and rapid in the underlying material. Surface runoff is slow. The content of organic matter in the surface layer is moderate.

Most areas of this soil are used for cultivated crops. Some areas are used for hay, pasture, or woodland.

This soil is well suited to corn and soybeans, but damage from floodwaters can be expected. Flooding is the major hazard. Crusting is also a concern. Small grain planted in the fall is subject to severe damage during periods of prolonged flooding. Late spring planting of adapted crops helps to minimize the damage or loss caused by flooding. Levees and dikes help to control flooding, but they are extremely expensive if properly constructed. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control scouring by floodwater, help to prevent crusting, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to moldboard, spring chisel, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture, but prolonged flooding can damage these crops in winter and spring. Levees and dikes help to control flooding. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during periods when the soil is wet

help to keep the pasture in good condition.

This soil is well suited to trees. The main management concerns are the equipment limitation and plant competition. The frequent flooding can delay planting and harvesting. The equipment limitation can be reduced by delaying timber harvest until dry periods. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of the flooding, this soil is generally unsuited to use as a site for dwellings and is severely limited as a site for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent flood damage.

The land capability classification is IIw. The woodland ordination symbol is 8A.

LnA—Lauramie silt loam, 0 to 2 percent slopes. This nearly level, very deep, well drained soil is on till plains and recessional moraines. Individual areas are irregular in shape and range from 2 to 80 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsoil is about 55 inches thick. It is dark yellowish brown, friable silt loam and dark brown, firm silty clay loam in the upper part; brown, firm clay loam, loam, and sandy clay loam in the next part; and yellowish brown, firm fine sandy loam in the lower part. The underlying material to a depth of 70 inches or more is yellowish brown fine sandy loam. In some areas unweathered glacial till is at a depth of less than 40 inches. In places the upper part of the subsoil has more sand. In a few areas stratified sandy and gravelly material is in the subsoil. In some places the surface layer is lighter colored. In other places the surface layer is dark and is more than 10 inches thick.

Included with this soil in mapping are the well drained Mellott, Octagon, and Tecumseh soils. Mellott and Tecumseh soils have less sand in the upper part of the subsoil than the Lauramie soil. They are in the less sloping areas at the higher elevations. Octagon soils have a solum that is less than 40 inches thick. They are in the more sloping areas. Also included are small areas of moderately well drained soils in drainageways. Included soils make up about 15 percent of the unit.

The available water capacity is high in the Lauramie soil. Permeability is moderate. Surface runoff is slow. The content of organic matter in the surface layer is moderate.

Most areas of this soil are used for cultivated crops. Some areas are used for hay or pasture. A few small areas are used as woodland.

This soil is well suited to corn, soybeans, and small grain. Crusting is a concern. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to moldboard, chisel, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

The shrink-swell potential is a moderate limitation if this soil is used as a site for dwellings. Foundations, footings, and basement walls should be strengthened. Backfilling with coarser material helps to prevent the structural damage caused by shrinking and swelling of the soil. Because of low strength, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic.

The land capability classification is I. No woodland ordination symbol is assigned.

LnB2—Lauramie silt loam, 2 to 6 percent slopes, eroded. This gently sloping, very deep, well drained soil is on rises and along drainageways on till plains and recessional moraines. Individual areas are irregular in shape and range from 2 to 80 acres in size.

Typically, the surface layer is dark brown silt loam about 9 inches thick. It contains dark brown material from the subsoil. The subsoil is 41 inches thick. It is dark brown, firm silty clay loam and clay loam in the upper part and dark yellowish brown, firm fine sandy loam in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown fine sandy loam. In some areas unweathered glacial till is at a depth of less than 40 inches. In places the surface layer and the upper part of the subsoil have more sand. In a few areas the lower part of the subsoil has stratified sandy and gravelly material. In some places the surface layer is lighter colored. In other places the dark surface layer is more than 10 inches thick.

Included with this soil in mapping are areas of the well drained Mellott, Octagon, and Tecumseh soils. Octagon soils have a solum that is less than 40 inches thick. They are in the more sloping areas. Mellott and Tecumseh soils have less sand in the upper part of the subsoil than the Lauramie soil. They are in the more level areas at the slightly higher elevations. Also

included are small severely eroded areas that have a surface soil of silty clay loam or clay loam. Included soils make up about 15 percent of the unit.

The available water capacity is high in the Lauramie soil. Permeability is moderate. Surface runoff is medium. The content of organic matter in the surface layer is moderate.

Most areas of this soil are used for cultivated crops. Some areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Erosion is a hazard. Crusting is also a concern. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, conservation tillage, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion, help to prevent crusting, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems. It is also well suited to spring moldboard and chisel tillage systems if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Erosion is a hazard. Growing grasses and legumes helps to control runoff and erosion. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

The shrink-swell potential is a severe limitation if this soil is used as a site for dwellings. Foundations, footings, and basement walls should be strengthened. Backfilling with coarser material helps to prevent the structural damage caused by shrinking and swelling of the soil. Because of low strength, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic.

The land capability classification is IIe. No woodland ordination symbol is assigned.

LoA—Linkville loam, loamy substratum, 0 to 2 percent slopes. This nearly level, very deep, well drained soil is on till plains and recessional moraines. Individual areas are irregular in shape and range from 2 to 100 acres in size.

Typically, the surface layer is very dark gray loam about 10 inches thick. The subsurface layer is very dark grayish brown, friable loam about 5 inches thick. The subsoil is about 55 inches thick. It is dark brown, friable loam and brown, firm clay loam in the upper part; dark yellowish brown, firm clay loam in the next part; and dark yellowish brown and brown, friable loam in the lower part. The underlying material to a depth of 80 inches or more is brown loam. In places, the surface layer is sandy loam and the upper part of the subsoil has less clay. In a few areas the subsoil has stratified sandy and gravelly material. In some places the dark surface layer is less than 10 inches thick.

Included with this soil in mapping are a few small areas of the well drained Spinks soils on rises. These soils have a lighter colored surface layer than the Linkville soil and have less clay in the subsoil. Also included are small areas that have slopes of more than 2 percent. Included areas make up about 10 percent of the unit.

The available water capacity is high in the Linkville soil. Permeability is moderate. Surface runoff is slow. The content of organic matter in the surface layer is moderate.

Most areas of this soil are used for cultivated crops. Some areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Crusting is a concern. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to moldboard, chisel, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suitable for use as a site for dwellings. Because of the potential for frost action, the soil is moderately limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is I. No woodland ordination symbol is assigned.

LoB—Linkville loam, loamy substratum, 2 to 6 percent slopes. This gently sloping, very deep, well drained soil is on rises and along drainageways on till

plains and recessional moraines. Individual areas are irregular in shape and range from 2 to 50 acres in size.

Typically, the surface layer is very dark grayish brown loam about 10 inches thick. The subsoil is 48 inches thick. It is dark brown, friable loam and firm clay loam in the upper part and dark yellowish brown and yellowish brown, friable loam in the lower part. The underlying material to a depth of 70 inches or more is brown loam. In some areas unweathered glacial till is at a depth of less than 40 inches. In places, the surface layer is sandy loam and the upper part of the subsoil contains less clay. In a few areas the dark surface layer is less than 10 inches thick.

Included with this soil in mapping are a few small areas of the well drained Spinks soils on rises and in the more sloping areas. These soils have a lighter colored surface layer than the Linkville soil and have less clay in the subsoil. They make up about 10 percent of the unit.

The available water capacity is high in the Linkville soil. Permeability is moderate. Surface runoff is medium. The content of organic matter in the surface layer is moderate.

Most areas of this soil are used for cultivated crops. Some areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Erosion is a hazard. Crusting is also a concern. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, conservation tillage, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion, help to prevent crusting, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems. It is also well suited to spring moldboard and chisel tillage systems if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Erosion is a hazard. Growing grasses and legumes helps to control runoff and erosion. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suitable for use as a site for dwellings. Because of the potential for frost action, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is IIe. No woodland ordination symbol is assigned.

LvB2—Longlois silt loam, 2 to 6 percent slopes, eroded. This gently sloping, well drained soil is on rises and along drainageways on outwash plains. It is deep over gravelly loamy coarse sand and sand. Individual areas are irregular in shape and range from 2 to 40 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. It contains dark brown material from the subsoil. The subsoil is 45 inches thick. It is dark brown, firm silty clay loam, clay loam, and sandy clay loam in the upper part and dark brown, firm gravelly and very gravelly sandy clay loam in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown gravelly loamy coarse sand that has strata of sand. In places glacial till is at a depth of less than 60 inches. In a few areas the lower part of the subsoil has less clay. In some places the surface layer is lighter colored.

Included with this soil in mapping are the well drained Bowes and Waupecan soils in the more level areas on the upper part of side slopes and on toe slopes. These soils have less sand in the upper part of the subsoil than the Longlois soil. Also included are severely eroded areas that have a surface soil of silty clay loam or clay loam and areas of the well drained Desker soils on knobs and in the more sloping areas. Desker soils have less clay in the subsoil than the Longlois soil. Also, they have a solum that is less than 40 inches thick. Included soils make up about 15 percent of the unit.

The available water capacity is high in the Longlois soil. Permeability is moderate in the solum and very rapid in the underlying material. Surface runoff is medium. The content of organic matter in the surface layer is moderate.

Most areas of this soil are used for cultivated crops. Some areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Erosion is a hazard. Crusting is also a concern. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, conservation tillage, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. Using a system of conservation tillage that leaves a protective

cover of crop residue on the surface and planting cover crops help to control erosion, help to prevent crusting, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems. It is also well suited to spring moldboard and chisel tillage systems if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Erosion is a hazard. Growing grasses and legumes helps to control runoff and erosion. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

The shrink-swell potential is a moderate limitation if this soil is used as a site for dwellings. Foundations, footings, and basement walls should be strengthened. Backfilling with coarser material helps to prevent the structural damage caused by shrinking and swelling of the soil. Because of low strength, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic.

The land capability classification is IIe. No woodland ordination symbol is assigned.

LwB2—Longlois silt loam, kame, 2 to 6 percent slopes, eroded. This sloping, well drained soil is on kames and eskers. It is deep over gravelly coarse sand. Individual areas are irregular in shape and range from 2 to 120 acres in size.

Typically, the surface layer is dark brown silt loam about 9 inches thick. It contains dark yellowish brown material from the subsoil. The subsoil is 50 inches thick. It is dark yellowish brown, firm silty clay loam and clay loam in the upper part and dark brown, firm gravelly sandy clay loam in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown gravelly coarse sand. In places glacial till is at a depth of less than 60 inches. In a few areas the lower part of the subsoil has less clay. In some areas the surface layer is lighter colored. In a few places the underlying material has thin strata ranging from silt loam to sandy loam.

Included with this soil in mapping are areas of the well drained Bowes, Desker, and Waupecan soils. Bowes and Waupecan soils have less sand in the upper part of the subsoil than the Longlois soil. They are in the more level areas. Desker soils are in the more sloping areas. They have less clay in the subsoil than the Longlois soil and have a solum that is less than 40 inches thick. Also included are small severely eroded areas that have a surface soil of silty clay loam or clay loam. Included soils make up about 15 percent of the unit.

The available water capacity is high in the Longlois soil. Permeability is moderate in the solum and very rapid in the underlying material. Surface runoff is medium. The content of organic matter in the surface layer is moderate.

Most areas of this unit are used for cultivated crops. Some areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Erosion is a hazard. Crusting is also a concern. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion, help to prevent crusting, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems. It is also well suited to spring moldboard and chisel tillage systems if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Erosion is a hazard. Growing grasses and legumes helps to control runoff and erosion. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

The shrink-swell potential is a moderate limitation if this soil is used as a site for dwellings. Foundations, footings, and basement walls should be strengthened. Backfilling with coarser material helps to prevent the structural damage caused by shrinking and swelling of the soil. Because of low strength, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic.

The land capability classification is IIe. No woodland ordination symbol is assigned.

Mb—Mahalasville silty clay loam, gravelly substratum. This nearly level, very poorly drained soil is in depressions on terraces and outwash plains. It is deep over very gravelly loamy sand and gravelly sand. It is frequently ponded by surface runoff from adjacent

areas. Individual areas are irregular in shape and range from 2 to 120 acres in size.

Typically, the surface layer is black silty clay loam about 9 inches thick. The subsurface layer also is black silty clay loam. It is about 4 inches thick. The subsoil is about 33 inches thick. The upper part is very dark gray and dark gray, mottled, firm silty clay loam, and the lower part is grayish brown and dark olive gray, mottled, firm clay loam and sandy clay loam. The underlying material to a depth of 60 inches or more is dark grayish brown very gravelly loamy sand and gravelly sand. In some areas the silty material is more than 40 inches thick. In places, the underlying gravelly material is thin and glacial till is within a depth of 60 inches. In some areas, the upper part of the subsoil has more sand and less clay and the underlying gravelly material is within a depth of 40 inches.

Included with this soil in mapping are the moderately well drained Waupecan and somewhat poorly drained Lafayette soils. These soils are in the slightly higher positions on the landscape. They make up about 10 percent of the unit.

The available water capacity is high in the Mahalasville soil. Permeability is moderate in the solum and very rapid in the underlying material. Surface runoff is very slow or ponded. The content of organic matter in the surface layer is high. The water table is at or above the surface, mainly during the winter and spring. The surface layer becomes cloddy and hard to work if tilled when too wet.

Most areas of this soil are used for cultivated crops. A few areas are used for hay, pasture, or woodland.

This soil is well suited to corn, soybeans, and small grain. Wetness and the ponding are major management concerns. Crusting is also a concern. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to fall moldboard, fall chisel, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. Wetness is a limitation, and ponding is a hazard. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. The equipment limitation is caused by wetness. The wetness can be overcome by performing woodland management activities during periods when the soil is relatively dry or is frozen. Site preparation, special planting stock, and overstocking help to overcome seedling mortality. Species that tolerate wetness should be planted. Using harvest methods that do not leave the remaining trees isolated or widely spaced helps to overcome the windthrow hazard. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of the ponding, this soil is generally unsuited to use as a site for dwellings. Because of low strength, the ponding, and the potential for frost action, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by ponding and by frost action.

The land capability classification is IIw. The woodland ordination symbol is 5W.

Mc—Mahalasville silty clay loam, shale substratum. This nearly level, very poorly drained soil is in depressions and drainageways on bedrock terraces. It is deep over shale bedrock. It is frequently ponded by surface runoff from adjacent areas. Individual areas are irregular in shape and range from 3 to 20 acres in size.

Typically, the surface layer is very dark gray silty clay loam about 10 inches thick. The subsoil is about 49 inches thick. It is dark gray and grayish brown, mottled, firm silty clay loam in the upper part; dark grayish brown and very dark grayish brown, mottled, firm clay loam and loam in the next part; and dark gray loamy coarse sand in the lower part. Weathered shale bedrock is at a depth of about 59 inches. In the west-central part of the county, the bedrock is interbedded siltstone and shale of Mississippian age. In some areas the underlying material is gravelly. In places the underlying shale is at a depth of less than 40 inches or more than 60 inches. In a few areas the upper part of the subsoil has more clay or more sand.

Included with this soil in mapping are small areas of the moderately well drained High Gap Variant and somewhat poorly drained Shadeland soils in the slightly higher positions on the landscape. Included soils make up about 10 percent of the unit.

The available water capacity is high in the Mahalasville soil. Permeability is moderate in the upper part of the solum and moderately rapid in the lower part. Surface runoff is very slow or ponded. The content of organic matter in the surface layer is high. The water table is at or above the surface during the winter and spring. The surface layer becomes cloddy and hard to work if tilled when too wet.

Most areas of this soil are used for cultivated crops. A few areas are used for hay, pasture, or woodland.

This soil is well suited to corn, soybeans, and small grain. Wetness and the ponding are the major management concerns. Crusting is also a concern. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to fall moldboard, fall chisel, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. Wetness is a limitation, and ponding is a hazard. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. The main management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. The equipment limitation is caused by wetness. The wetness can be overcome by performing woodland management activities during periods when the soil is relatively dry or is frozen. Site preparation, special planting stock, and overstocking help to overcome seedling mortality. Species that tolerate wetness should be planted. Using harvest methods that do not leave the remaining trees isolated or widely spaced helps to overcome the windthrow hazard. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of the ponding, this soil is generally unsuited to use as a site for dwellings. Because of low strength, the potential for frost action, and the ponding, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by ponding and by frost action.

The land capability classification is IIw. The woodland ordination symbol is 5W.

Md—Mahalasville-Treaty complex. This map unit consists of nearly level, very poorly drained soils in depressions and drainageways on till plains and recessional moraines. It is frequently ponded by surface runoff from adjacent areas. The Mahalasville soil is very deep over compact glacial till, and the Treaty soil is deep over compact glacial till. Individual areas of this unit are irregular in shape and generally range from 2 to 100 acres in size, but some broad areas are more than 1,000 acres in size. The areas of this unit are about 50 percent Mahalasville soil and 35 percent Treaty soil. The two soils occur as areas so intricately mixed that it was not practical to map them separately.

Typically, the surface layer of the Mahalasville soil is black silty clay loam about 12 inches thick. The subsoil is about 36 inches thick. The upper part is dark gray and grayish brown, mottled, firm silty clay loam. The lower part is grayish brown, mottled, firm loam that has strata of silt loam. The underlying material to a depth of 60 inches or more is light olive brown loamy sand that has strata of fine sandy loam. In places the underlying material is gravelly. In a few small areas the soil has more than 40 inches of silty material. In some places glacial till is within a depth of 60 inches.

Typically, the surface layer of the Treaty soil is very dark grayish brown silty clay loam about 10 inches thick. The subsoil is about 38 inches thick. It is dark gray and grayish brown, mottled, firm silty clay loam in the upper part and grayish brown, mottled, firm silt loam and loam in the lower part. The underlying material to a depth of 60 inches or more is light olive brown, mottled loam. In a few small areas, stratified material is above the underlying glacial till. In places the underlying compact glacial till is within a depth of 40 inches. In some areas the soil has more than 40 inches of silty material.

Included with these soils in mapping are small areas of the somewhat poorly drained Crosby, Fincastle, and

Starks soils in the slightly higher positions on the landscape. Included soils make up about 10 percent of the unit.

The available water capacity is very high in the Mahalasville soil and high in the Treaty soil. Permeability is moderate in the Mahalasville soil. It is moderate in the solum of the Treaty soil and moderately slow in the underlying material. Surface runoff is very slow or ponded on both soils. The content of organic matter in the surface layer is high. The water table is at or above the surface, mainly during the winter and spring. The surface layer of both soils becomes cloddy and hard to work if tilled when too wet.

Most areas are used for cultivated crops. A few areas are used for hay, pasture, or woodland.

These soils are well suited to corn, soybeans, and small grain. Wetness and the ponding are the major management concerns. Crusting is also a concern. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. These soils are well suited to fall moldboard, fall chisel, and ridge-till tillage systems.

These soils are well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. Wetness is a limitation, and ponding is a hazard. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

These soils are well suited to trees. The main management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. The equipment limitation is caused by wetness. The wetness can be overcome by performing woodland management activities during periods when the soils are relatively dry or are frozen. Site preparation, special planting stock, and overstocking help to overcome seedling mortality. Species that tolerate wetness should be planted. Using harvest methods that do not leave the remaining trees isolated or widely spaced helps to overcome the windthrow hazard. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of the ponding, these soils are generally unsuited to use as sites for dwellings. Because of low strength, the ponding, and the potential for frost action, the soils are severely limited as sites for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by ponding and by frost action.

The land capability classification is IIw. The woodland ordination symbol is 5W.

MmB2—Marker silt loam, 2 to 6 percent slopes, eroded. This gently sloping, moderately well drained soil is on recessional moraines. It is moderately deep over compact glacial till. Individual areas are irregular in shape and range from 2 to 350 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. It contains olive brown material from the subsoil. The subsoil is about 18 inches thick. The upper part is olive brown, firm clay loam; the next part is light olive brown, mottled, firm clay loam; and the lower part is light olive brown, mottled, firm silt loam. The underlying material to a depth of 60 inches or more is olive silt loam. In some places the dark surface layer is 10 or more inches thick. In a few areas stratified material is above the glacial till. In some places the upper part of the subsoil has more clay. In other places the surface layer is lighter colored.

Included with this soil in mapping are the somewhat poorly drained Beecher soils in the more level areas. Also included are a few areas of the poorly drained Drummer soils in depressions and drainageways. Included soils make up about 10 percent of the unit.

The available water capacity is moderate in the Marker soil. Permeability is moderate in the solum and slow in the underlying material. Surface runoff is medium. The content of organic matter in the surface layer is moderate. The water table is at a depth of 1.5 to 3.0 feet in winter and spring.

Most areas of this soil are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Erosion is a hazard. Crusting is also a concern. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. Using a system of

conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion, help to prevent crusting, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems. It is also well suited to spring moldboard and chisel tillage systems if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Erosion is a hazard. Growing grasses and legumes helps to control runoff and erosion. Overgrazing and grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

The wetness is a moderate limitation if this soil is used as a site for dwellings without basements. It is a severe limitation on sites for dwellings with basements. Constructing buildings on raised, well compacted fill material helps to overcome the wetness. Installing subsurface drains helps to lower the water table. Because of the potential for frost action, the soil is severely limited as a site for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is IIe. No woodland ordination symbol is assigned.

MoA—Mellott silt loam, 0 to 2 percent slopes. This nearly level, very deep, well drained soil is on till plains. Individual areas are irregular in shape and range from 2 to 150 acres in size.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is about 41 inches thick. It is dark brown, friable silt loam and dark yellowish brown, firm silty clay loam in the upper part; dark brown, firm loam and sandy clay loam in the next part; and yellowish brown, firm fine sandy loam in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown loam. In places the dark surface layer is 10 or more inches thick. In a few areas the surface layer is lighter colored. In some places the depth to glacial till is more than 60 inches.

Included with this soil in mapping are the moderately well drained Throckmorton soils and the somewhat poorly drained Toronto and Millbrook soils in the slightly lower positions on the landscape. These soils make up about 12 percent of the unit.

The available water capacity is high in the Mellott soil. Permeability is moderate. Surface runoff is slow. The content of organic matter in the surface layer is moderate.

Most areas of this soil are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Crusting is a concern. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to moldboard, chisel, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

The shrink-swell potential is a moderate limitation if this soil is used as a site for dwellings. Foundations, footings, and basement walls should be strengthened. Backfilling with coarser material helps to prevent the structural damage caused by shrinking and swelling of the soil. Because of low strength and the potential for frost action, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is I. No woodland ordination symbol is assigned.

MsC2—Miami silt loam, 6 to 12 percent slopes, eroded. This moderately sloping, well drained soil is in undulating areas and along drainageways on till plains and recessional moraines. It is moderately deep over compact glacial till. Individual areas are long and narrow or irregularly shaped and range from 2 to 150 acres in size.

Typically, the surface layer is brown silt loam about 9 inches thick. It contains dark yellowish brown material from the subsoil. The subsoil is 26 inches thick. It is dark yellowish brown, firm silty clay loam in the upper part and dark yellowish brown and yellowish brown, firm clay loam and loam in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown loam. In places the underlying compact glacial till is at a depth of less than 24 inches. In a few areas the surface layer is darker.

Included with this soil in mapping are areas of the

somewhat poorly drained Crosby and Fincastle soils on toe slopes and in drainageways and the well drained Richardville soils in landscape positions similar to those of the Miami soil. Richardville soils have a solum that is more than 40 inches thick. Also included are small severely eroded areas that have a surface soil of silty clay loam or clay loam. Included soils make up about 15 percent of the unit.

The available water capacity is moderate in the Miami soil. Permeability is moderate in the upper part of the subsoil, moderately slow in the lower part of the subsoil, and slow in the underlying material. Surface runoff is medium. The content of organic matter in the surface layer is moderately low.

Most areas of this soil are used for cultivated crops. A few areas are used for hay, pasture, or woodland.

This soil is fairly well suited to corn, soybeans, and small grain. Erosion is the major hazard. Crusting is also a concern. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion, help to prevent crusting, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems. It is also well suited to spring chisel if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Erosion is a hazard. Growing grasses and legumes helps to control runoff and erosion. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is moderate. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

The shrink-swell potential and the slope are moderate limitations if this soil is used as a site for dwellings. Foundations, footings, and basement walls should be strengthened. Backfilling with coarser material helps to prevent the structural damage caused by shrinking and swelling of the soil. The buildings should be designed so that they conform to the natural slope of the land. Because of low strength, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic.

The land capability classification is IIIe. The woodland ordination symbol is 5A.

MsD2—Miami silt loam, 12 to 18 percent slopes, eroded. This strongly sloping, well drained soil is in undulating areas and along drainageways on till plains and recessional moraines. It is moderately deep over compact glacial till. Individual areas are long and narrow or irregularly shaped and range from 2 to 80 acres in size.

Typically, the surface layer is dark brown silt loam about 8 inches thick. It contains dark yellowish brown material from the subsoil. The subsoil is firm clay loam about 24 inches thick. It is dark yellowish brown in the upper part and brown in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown loam. In places the underlying compact glacial till is at a depth of less than 24 inches. In a few areas the surface layer is darker.

Included with this soil in mapping are areas that have slopes of more than 18 percent on short breaks along drainageways and streams and areas of the well drained Richardville soils on the upper part of side slopes. Richardville soils have a solum that is more than 40 inches thick. Also included are small severely eroded areas that have a surface soil of silty clay loam or clay loam. Included soils make up about 15 percent of the unit.

The available water capacity is moderate in the Miami soil. Permeability is moderate in the upper part of the subsoil, moderately slow in the lower part of the subsoil, and slow in the underlying material. Surface runoff is rapid. The content of organic matter in the surface layer is moderately low.

Most areas of this soil are used for hay or pasture. A few areas are used for cultivated crops or as woodland or are idle land.

This soil is poorly suited to corn, soybeans, and small grain. Erosion is the major hazard. Crusting is also a concern. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion, help to prevent crusting, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter.

This soil is fairly well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay. It is well suited to pasture. Erosion is a hazard. Growing grasses and legumes helps to control runoff and erosion. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is moderate. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

The slope is a severe limitation if this soil is used as a site for dwellings. The buildings should be designed so that they conform to the natural slope of the land. Because of the slope and low strength, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Cuts and fills are needed. Where possible, building the roads on the contour helps to overcome the slope.

The land capability classification is IVe. The woodland ordination symbol is 5A.

MtC3—Miami clay loam, 6 to 12 percent slopes, severely eroded. This moderately sloping, well drained soil is in undulating areas and along drainageways on till plains and recessional moraines. It is moderately deep over compact glacial till. In most areas, the original dark surface layer has been removed by erosion and tillage has mixed the rest with the upper part of the subsoil. Individual areas of this soil are long and narrow or irregularly shaped and range from 2 to 40 acres in size.

Typically, the surface layer is brown clay loam about 7 inches thick. The subsoil is 22 inches thick. It is dark yellowish brown, firm clay loam in the upper part and yellowish brown, firm loam in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown loam. In some places the underlying compact glacial till is at a depth of less than 24 inches. In a few areas the surface layer is darker.

Included with this soil in mapping are the somewhat poorly drained Fincastle and Crosby soils on toe slopes and in drainageways and areas of the well drained Richardville soils in landscape positions similar to those of the Miami soil. Richardville soils have a solum that is more than 40 inches thick. Also included are soils that have a cobbly surface layer. Included soils make up about 15 percent of the unit.

The available water capacity is moderate in the Miami soil. Permeability is moderate in the upper part of the subsoil, moderately slow in the lower part of the subsoil, and slow in the underlying material. Surface runoff is medium. The content of organic matter in the surface layer is low. The surface layer becomes cloddy and hard to work if tilled when too wet.

Most areas of this soil are used for cultivated crops. A few areas are used for hay, pasture, or woodland.

This soil is poorly suited to corn, soybeans, and small grain. Erosion is the major hazard. Crusting is also a concern. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion, help to prevent crusting, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems. It is also well suited to spring chisel if the new crop is planted into corn residue.

This soil is fairly well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay. It is well suited to pasture. Erosion is a hazard. Growing grasses and legumes helps to control runoff and erosion. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is moderate. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

The shrink-swell potential and the slope are moderate limitations if this soil is used as a site for dwellings. Foundations, footings, and basement walls should be strengthened. Backfilling with coarser material helps to prevent the structural damage caused by shrinking and swelling of the soil. The buildings should be designed so that they conform to the natural slope of the land. Because of low strength, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic.

The land capability classification is IVe. The woodland ordination symbol is 5A.

MtD3—Miami clay loam, 12 to 18 percent slopes, severely eroded. This strongly sloping, well drained soil is in undulating areas and along drainageways on till plains and recessional moraines. It is moderately deep over compact glacial till. In most areas, the original dark surface layer has been removed by erosion and tillage has mixed the rest with the upper part of the subsoil. Individual areas of this soil are long and narrow or irregularly shaped and range from 2 to 10 acres in size.

Typically, the surface layer is dark yellowish brown clay loam about 5 inches thick. The subsoil is 24 inches thick. It is dark yellowish brown, firm clay loam in the upper part and yellowish brown, firm clay loam and loam in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown loam. In places the underlying compact glacial till is at a depth of less than 24 inches. In a few areas the surface layer is darker.

Included with this soil in mapping are areas that have slopes of more than 18 percent on short breaks along drainageways and streams and areas of the well drained Richardville soils on the upper part of side slopes. Richardville soils have a solum that is more than 40 inches thick. Also included are soils that have a cobbly surface layer. Included soils make up about 15 percent of the unit.

The available water capacity is moderate in the Miami soil. Permeability is moderate in the upper part of the subsoil, moderately slow in the lower part of the subsoil, and slow in the underlying material. Surface runoff is rapid. The content of organic matter in the surface layer is low. The surface layer becomes cloddy and hard to work if tilled when too wet.

Most areas of this soil are used for hay or pasture. A few areas are used for cultivated crops or as woodland.

Because of the severe hazard of erosion, this soil is generally unsuited to corn, soybeans, and small grain.

This soil is poorly suited to grasses and legumes, such as orchardgrass and alfalfa, for hay. It is fairly well suited to pasture. Erosion is a hazard. Growing grasses and legumes helps to control runoff and erosion. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is moderate. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

The slope is a severe limitation if this soil is used as a site for dwellings. The buildings should be designed so that they conform to the natural slope of the land. Because of the slope and low strength, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Cuts and fills are needed. Where possible, building the roads on the contour helps to overcome the slope.

The land capability classification is VIe. The woodland ordination symbol is 5A.

Mu—Milford silty clay loam, pothole. This nearly level, very deep, very poorly drained soil is in potholes on recessional moraines, outwash plains, and till plains. It is frequently ponded by surface runoff from adjacent areas. Individual areas are irregular in shape and range from 2 to 50 acres in size.

Typically, the surface layer is very dark gray silty clay loam about 11 inches thick. The subsurface layer is black silty clay loam about 4 inches thick. The subsoil is about 39 inches thick. It is mottled. It is dark gray, firm silty clay in the upper part and dark grayish brown and olive gray, firm silty clay loam in the lower part. The underlying material to a depth of 60 inches or more is olive gray, mottled silt loam. In places the soil has an overwash of light colored silt loam. In a few areas the subsoil has less clay. In some places the dark surface layer is more than 24 inches thick.

Included with this soil in mapping are areas of the very poorly drained Mahalasville and Treaty soils and the poorly drained Drummer soils in the slightly higher landscape positions at the edges of potholes. These soils have less clay in the upper part of the subsoil than the Milford soil. They make up about 15 percent of the unit.

The available water capacity is high in the Milford soil. Permeability is moderately slow. Surface runoff is very slow or ponded. The content of organic matter in the surface layer is high. The water table is at or above the surface, mainly during the winter and spring. The surface layer becomes cloddy and hard to work if tilled when too wet.

Most areas of this soil are used for cultivated crops. A few areas are used for hay or pasture.

This soil is poorly suited to corn and soybeans. Wetness and the ponding are the major management concerns (fig. 9). Crusting is also a concern. Small grain planted in the fall is subject to severe damage during periods of prolonged ponding. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover

Figure 9.—Crop damage caused by ponding in an area of Milford silty clay loam, pothole. The corn in the background is in an area of Crosby-Miami complex, 2 to 6 percent slopes, eroded.

crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to fall moldboard, fall chisel, and ridge-till tillage systems.

This soil is fairly well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay. It is well suited to pasture. Wetness is a limitation, and ponding is a hazard. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet

can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

Because of the ponding, this soil is generally unsuited to use as a site for dwellings. Because of low strength, the ponding, and the potential for frost action, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by ponding and by frost action.

The land capability classification is IVw. No woodland ordination symbol is assigned.

MwA—Mulvey silt loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on outwash plains. It is deep or very deep over gravelly coarse sand. Individual areas are irregular in shape and range from 2 to 60 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsoil is about 57 inches thick. It is mottled. It is yellowish brown, firm silt loam and silty clay loam in the upper part; dark yellowish brown, firm clay loam in the next part; and dark yellowish brown, firm gravelly sandy clay loam and grayish brown, friable gravelly sandy loam in the lower part. The underlying material to a depth of 80 inches or more is gray gravelly coarse sand. In places the dark surface layer is more than 10 inches thick. In a few small areas the thickness of the silty material is less than 24 inches or more than 40 inches. In a few places the surface layer is lighter colored.

Included with this soil in mapping are the moderately well drained Bowes Variant and well drained Bowes soils in the slightly higher lying areas. Also included, in depressions, are the very poorly drained Mahalasville soils that have a gravelly substratum. Included soils make up about 15 percent of the unit.

The available water capacity is high in the Mulvey soil. Permeability is moderate in the solum and very rapid in the underlying material. Surface runoff is slow. The content of organic matter in the surface layer is moderate. The water table is at a depth of 1 to 3 feet in winter and spring.

Most areas of this soil are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Wetness is a major limitation. Crusting is also a concern. Subsurface drains can be used to remove excess water if adequate outlets are available. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to moldboard, fall chisel, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. Wetness is a limitation. Subsurface drains can be used to remove excess water if adequate outlets are available. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is severe. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

The wetness is a severe limitation if this soil is used as a site for dwellings. Installing subsurface drains helps to lower the water table. Constructing buildings on raised, well compacted fill material also helps to overcome the wetness. Because of low strength and the potential for frost action, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is IIw. The woodland ordination symbol is 4A.

Mz—Muskego muck, drained. This nearly level, very deep, very poorly drained soil is in depressions on outwash plains, terraces, recessional moraines, and till plains. It is frequently ponded by surface runoff from adjacent areas. Individual areas are irregular in shape and range from 2 to 100 acres in size.

Typically, the surface layer is black muck about 10 inches thick. Below this, to a depth of 39 inches, is muck. It is black and friable in the upper part and very dark gray and firm in the lower part. The underlying material to a depth of 60 inches or more is dark olive gray coprogenous earth. In some areas overwash mineral material has been mixed with the surface layer. In a few small areas, mineral material is within a depth of 51 inches. In some places the organic material is more than 51 inches thick.

Included with this soil in mapping are areas of the

very poorly drained Mahalasville, Treaty, and Pella soils and the poorly drained Drummer soils in the slightly higher landscape positions at the edges of deep depressions. These soils formed in mineral material. Also included are some areas that have not been drained. Included areas make up about 15 percent of the unit.

The available water capacity is very high in the Muskego soil. Permeability is moderate or moderately rapid in the organic material and slow in the coprogenous earth. Surface runoff is very slow or ponded. The content of organic matter in the surface layer is very high. The water table is at or above the surface from late fall through spring.

Most areas of this soil are used for cultivated crops. A few areas are used for hay, pasture, or woodland or are idle land.

This soil is poorly suited to corn and soybeans. Wetness is the major limitation, and ponding and soil blowing are hazards. Small grain planted in the fall is subject to severe damage during periods of prolonged ponding. Subsurface drains can be used to remove excess water if adequate outlets are available. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or using a combination of these practices or by maintaining a permanent cover of vegetation. This soil is well suited to spring moldboard or spring chisel tillage systems if the new crop is planted into corn residue.

This soil is fairly well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay. It is well suited to pasture. Wetness is a limitation, and ponding and soil blowing are hazards. Subsurface drains and shallow surface drains can be used to remove excess water if adequate outlets are available. Growing grasses and legumes helps to control soil blowing. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is poorly suited to trees. The main management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. The equipment limitation is caused by wetness. The wetness can be overcome by performing woodland management activities during periods when the soil is relatively dry or is frozen. Site preparation, special planting stock, and overstocking help to overcome seedling mortality. Species that tolerate wetness should be planted. Using harvest methods that do not leave the remaining trees isolated or widely spaced helps to overcome the windthrow hazard. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of the ponding and subsidence, this soil is generally unsuited to use as a site for dwellings. Because of the ponding, the subsidence, and the potential for frost action, the soil is severely limited as a site for local roads and streets. Replacing the organic material with a more suitable base material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by ponding and by frost action.

The land capability classification is IVw. The woodland ordination symbol is 2W.

OaB2—Oakville-Billett, moderately wet, complex, 2 to 6 percent slopes, eroded. This map unit consists of gently sloping, very deep soils on sand dunes. The Oakville soil is somewhat excessively drained and is on knolls, shoulder slopes, and the more sloping part of side slopes. The Billett soil is moderately well drained and is on toe slopes, in drainageways, and on the less sloping part of side slopes. Individual areas of this unit are elongated or irregularly shaped and range from 2 to 120 acres in size. They are about 50 percent Oakville soil and 35 percent Billett soil. The two soils occur as areas so intricately mixed or so small that it was not practical to map them separately.

Typically, the surface layer of the Oakville soil is dark brown loamy fine sand about 8 inches thick. It contains dark yellowish brown material from the subsoil. The subsoil to a depth of 80 inches or more is dark yellowish brown and yellowish brown, friable and very friable loamy fine sand. In some areas the surface layer is darker. In a few places the lower part of the subsoil has more clay or bands.

Typically, the surface layer of the moderately wet Billett soil is very dark grayish brown fine sandy loam about 8 inches thick. It contains dark yellowish brown material from the subsoil. The subsoil extends to a depth of 80 inches or more. It is dark yellowish brown and strong brown, friable fine sandy loam in the upper part and dark yellowish brown and light brownish gray, mottled, friable loamy fine sand and grayish brown, very friable loamy fine sand in the lower part. In some places the surface layer is lighter colored. In a few areas the subsoil has more clay. In a few places the dark surface

layer is more than 10 inches thick.

Included with these soils in mapping are areas of the somewhat poorly drained La Hogue soils. These included soils are in the less sloping areas and on toe slopes of dune ridges. They make up about 10 percent of the unit.

The available water capacity is low in the Oakville soil and moderate in the Billett soil. Permeability is rapid in the Oakville soil and moderately rapid in the Billett soil. Surface runoff is medium on both soils. The content of organic matter in the surface layer is moderately low. The Billett soil has a high water table at a depth of 3 to 6 feet in winter and early spring.

Most areas of these soils are used for cultivated crops. A few areas are used for hay or pasture.

These soils are poorly suited to corn, soybeans, and small grain. Water erosion and soil blowing are hazards. Droughtiness is a limitation. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage, ridging at an angle to the prevailing wind, planting buffer strips or vegetative barriers, or using a combination of these practices or by maintaining a permanent cover of vegetation. Irrigation helps to overcome the droughtiness. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion and soil blowing, reduce the evaporation rate, and maintain or improve tilth, infiltration, aeration, and the content of organic matter. These soils are well suited to no-till and ridge-till tillage systems and to spring chisel if the new crop is planted into corn residue.

These soils are fairly well suited to grasses and legumes, such as smooth bromegrass and alfalfa, for hay. They are well suited to pasture. Water erosion and soil blowing are hazards. Droughtiness is a limitation. Deep-rooted legumes and drought-tolerant species should be selected. Growing grasses and legumes helps to control runoff, erosion, and soil blowing. Irrigation helps to overcome the droughtiness. Overgrazing and grazing when the soils are too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during the summer and during wet periods help to keep the pasture in good condition.

These soils are well suited to trees. The main management concerns in areas of the Oakville soil are the equipment limitation and seedling mortality. Plant competition is moderate in areas of the Billett soil. Equipment tends to bog down in sandy soils when they are dry. The equipment limitation can be reduced by delaying timber harvest until periods when the soil is moist or frozen. Site preparation, special planting stock, and overplanting help to overcome seedling mortality. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

The Oakville soil is suitable for use as a site for dwellings and local roads and streets. The Billett soil is suitable for use as a site for dwellings without basements. The wetness of the Billett soil is a moderate limitation on sites for dwellings with basements. An adequate foundation drainage system is needed to lower the water table. Because of the potential for frost action, the Billett soil is moderately limited as a site for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is IVs. The woodland ordination symbol is 4S for the Oakville soil and 4A for the Billett soil.

OgA—Ockley silt loam, 0 to 2 percent slopes. This nearly level, well drained soil is on outwash plains and stream terraces. It is deep or very deep over very gravelly coarse sand. Individual areas are irregular in shape and range from 2 to 80 acres in size.

Typically, the surface layer is brown silt loam about 11 inches thick. The subsoil is about 52 inches thick. It is dark yellowish brown, friable silt loam in the upper part; brown, firm clay loam in the next part; and brown, firm gravelly clay loam and dark brown, gravelly coarse sandy loam in the lower part. The underlying material to a depth of 70 inches or more is yellowish brown very gravelly coarse sand. In some places the surface layer is darker. In a few small areas the lower part of the subsoil has less clay and less gravel.

Included with this soil in mapping are the well drained Kosciusko soils in the more sloping areas along terrace breaks. These soils have a solum that is less than 40 inches thick. They make up about 10 percent of the unit.

The available water capacity is high in the Ockley soil. Permeability is moderate in the solum and very rapid in the underlying material. Surface runoff is slow. The content of organic matter in the surface layer is moderately low.

Most areas of this soil are used for cultivated crops. A few areas are used for hay, pasture, or woodland.

This soil is well suited to corn, soybeans, and small

grain. Crusting is a concern. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to moldboard, chisel, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is moderate. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

The shrink-swell potential is a moderate limitation if this soil is used as a site for dwellings. Foundations, footings, and basement walls should be strengthened. Backfilling with coarser material helps to prevent the structural damage caused by shrinking and swelling of the soil. Because of low strength and the shrink-swell potential, the soil is moderately limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic.

The land capability classification is I. The woodland ordination symbol is 5A.

OmB2—Octagon silt loam, 2 to 6 percent slopes, eroded. This gently sloping, well drained soil is on rises and breaks along drainageways on till plains and recessional moraines. It is moderately deep over compact glacial till. Individual areas are irregular in shape and range from 2 to 100 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. It contains dark yellowish brown material from the subsoil. The subsoil is about 29 inches thick. It is dark yellowish brown, firm silty clay loam in the upper part and dark yellowish brown and yellowish brown, firm sandy clay loam in the lower part. The underlying material to a depth of 60 inches or more is brown fine sandy loam. In places the dark surface layer is more than 10 inches thick. In some areas the surface layer is lighter colored. In a few places the underlying compact glacial till is at a depth of less than 24 inches.

Included with this soil in mapping are the well drained Lauramie soils at the slightly higher elevations. These soils have a solum that is more than 40 inches thick. Also included are small areas of the somewhat poorly drained Millbrook and Toronto soils in drainageways and on toe slopes and soils that have slopes of more than 6 percent along drainageways and small breaks. Included soils make up about 15 percent of the unit.

The available water capacity is moderate in the Octagon soil. Permeability is moderate in the solum and slow in the underlying material. Surface runoff is medium. The content of organic matter in the surface layer is moderate.

Most areas of this soil are used for cultivated crops. Some areas are used for hay or pasture. A few small areas are used as woodland.

This soil is well suited to corn, soybeans, and small grain. Erosion is a hazard. Crusting is also a concern. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion, help to prevent crusting, and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems. It is also well suited to spring moldboard and chisel tillage systems if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Erosion is a hazard. Growing grasses and legumes for hay and pasture helps to control erosion. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suitable for use as a site for dwellings. Because of low strength, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic.

The land capability classification is IIe. No woodland ordination symbol is assigned.

OmC2—Octagon silt loam, 6 to 12 percent slopes, eroded. This moderately sloping, well drained soil is in undulating areas and along drainageways on till plains and recessional moraines. It is moderately deep over

compact glacial till. Individual areas are long and narrow or irregularly shaped and range from 2 to 40 acres in size.

Typically, the surface layer is dark brown silt loam about 8 inches thick. It contains brown material from the subsoil. The subsoil is 20 inches thick. It is brown and dark yellowish brown, firm clay loam in the upper part and yellowish brown, firm loam in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown fine sandy loam. In some areas the underlying compact glacial till is at a depth of less than 24 inches. In a few places the surface layer is lighter colored.

Included with this soil in mapping are the somewhat poorly drained Toronto and Millbrook soils on toe slopes and in drainageways and small areas of the well drained Lauramie soils on the upper part of side slopes. Lauramie soils have a solum that is more than 40 inches thick. Also included are a few small severely eroded areas that have a surface soil of silty clay loam or clay loam. Included soils make up about 15 percent of the unit.

The available water capacity is moderate in the Octagon soil. Permeability is moderate in the solum and slow in the underlying material. Surface runoff is medium. The content of organic matter in the surface layer is moderate.

Most areas of this soil are used for cultivated crops. A few areas are used for hay, pasture, or woodland.

This soil is fairly well suited to corn, soybeans, and small grain. Erosion is the major hazard. Crusting is also a concern. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion, help to prevent crusting, and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems and to spring chisel if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Erosion is a hazard. Growing grasses and legumes helps to control runoff and erosion. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

The slope is a moderate limitation if this soil is used as a site for dwellings. The buildings should be designed so that they conform to the natural slope of the land. Because of low strength, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic.

The land capability classification is IIIe. No woodland ordination symbol is assigned.

OpC3—Octagon clay loam, 6 to 12 percent slopes, severely eroded. This moderately sloping, well drained soil is in undulating areas and along drainageways on till plains and recessional moraines. It is moderately deep over compact glacial till. In most areas, the original surface layer has been removed by erosion and tillage has mixed the rest with the upper part of the subsoil. Individual areas of this soil are long and narrow or irregularly shaped and range from 2 to 60 acres in size.

Typically, the surface layer is dark brown clay loam about 8 inches thick. The subsoil is 20 inches thick. It is dark yellowish brown, firm clay loam in the upper part and yellowish brown, firm loam in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown loam. In places the glacial till is silt loam. In some areas the underlying compact glacial till is at a depth of less than 24 inches. In a few places the surface layer is lighter colored.

Included with this soil in mapping are the somewhat poorly drained Millbrook and Toronto soils on toe slopes and in drainageways and small areas of the well drained Lauramie soils on the upper part of side slopes. Lauramie soils have a solum that is more than 40 inches thick. Also included are soils that have a cobbly surface layer. Included soils make up about 15 percent of the unit.

The available water capacity is moderate in the Octagon soil. Permeability is moderate in the solum and slow in the underlying material. Surface runoff is medium. The content of organic matter in the surface layer is moderately low. The surface layer becomes cloddy and hard to work if tilled when too wet.

Most areas of this soil are used for cultivated crops. A few areas are used for hay, pasture, or woodland.

This soil is poorly suited to corn, soybeans, and small grain. Erosion is the major hazard. Crusting is also a concern. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. Using a system of conservation tillage that leaves a protective cover of

crop residue on the surface and planting cover crops help to control erosion, help to prevent crusting, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems and to spring chisel if the new crop is planted into corn residue.

This soil is fairly well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay. It is well suited to pasture. Erosion is a hazard. Growing grasses and legumes helps to control runoff and erosion. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

The slope is a moderate limitation if this soil is used as a site for dwellings. The buildings should be designed so that they conform to the natural slope of the land. Because of low strength, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic.

The land capability classification is IVe. No woodland ordination symbol is assigned.

Ou—Ouiatenon sandy loam, frequently flooded. This nearly level, somewhat excessively drained soil is on flood plains. It is deep over very gravelly sand, gravelly sand, and sand. It is subject to frequent flooding for brief periods from late fall through spring. Individual areas are irregular in shape and range from 3 to 80 acres in size.

Typically, the surface layer is very dark gray sandy loam about 6 inches thick. The subsurface layer is very dark gray, very friable loamy sand about 5 inches thick. The underlying material extends to a depth of 60 inches or more. It is dark brown loamy sand in the upper part and yellowish brown, stratified very gravelly sand, gravelly sand, and sand in the lower part. In places the upper part of the underlying material has more clay. In some areas the surface layer is lighter colored. In a few areas the upper part of the underlying material has more gravel.

Included with this soil in mapping are some moderately well drained soils, the somewhat poorly drained Ceresco soils, and the very poorly drained Cohoctah soils. These soils are in areas farther away from stream channels adjacent to uplands. Also included are some soils that have a gravelly or very gravelly surface layer. Included soils make up about 15 percent of the unit.

The available water capacity is low in the Ouiatenon soil. Permeability is rapid in the upper part of the underlying material and very rapid in the lower part. Surface runoff is slow. The content of organic matter in the surface layer is moderate.

Most areas of this soil are used as woodland. Some areas are used for cultivated crops or for hay or pasture.

This soil is fairly well suited to corn and soybeans, but damage from floodwaters can be expected. Flooding and soil blowing are major hazards, and droughtiness is a limitation. Small grain planted in the fall is subject to severe damage during periods of prolonged flooding. Late spring planting of adapted crops helps to minimize the damage or loss caused by flooding. Levees or dikes help to control flooding, but they are extremely expensive if properly constructed. Irrigation can overcome the droughtiness. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control soil blowing and scouring by floodwater, reduce the evaporation rate, and maintain or improve soil tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems. It is also well suited to spring moldboard and spring chisel tillage systems if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as smooth bromegrass and alfalfa, for hay and pasture, but prolonged flooding can damage these crops from late fall through spring. Flooding and soil blowing are hazards, and droughtiness is a limitation. Levees and dikes help to control flooding. Growing grasses and legumes helps to control soil blowing. Irrigation can overcome the droughtiness. Deep-rooted legumes and drought-tolerant species should be selected. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during the summer and during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is moderate. The frequent flooding can delay planting and harvesting. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of the flooding, this soil is generally unsuited to use as a site for dwellings. The flooding is also a severe limitation on sites for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by flooding.

The land capability classification is IIIs. The

woodland ordination symbol is 6A.

Ox—Ouiatenon loamy sand, occasionally flooded. This nearly level, somewhat excessively drained soil is on flood plains. It is deep over very gravelly coarse sand. It is subject to occasional flooding for brief periods from late fall through spring. Individual areas are irregular in shape and range from 2 to 100 acres in size.

Typically, the surface layer is very dark gray loamy sand about 12 inches thick. The subsurface layer is about 8 inches thick. It is very dark grayish brown, very friable loamy sand in the upper part and dark brown, very friable coarse sand in the lower part. The underlying material extends to a depth of 60 inches or more. It is dark brown coarse sand in the upper part and dark brown very gravelly coarse sand in the lower part. In places the upper part of the underlying material has more clay. In a few small areas the underlying material has less gravel. In some places the upper part of the underlying material has more gravel. In other places no carbonates are in the surface soil and the upper part of the underlying material. In some areas the surface layer is lighter colored.

Included with this soil in mapping are some moderately well drained soils, the somewhat poorly drained Ceresco soils, and the very poorly drained Cohoctah soils. These soils are in areas farther away from stream channels adjacent to uplands. Also included are soils that have a gravelly or very gravelly surface layer. Included soils make up about 15 percent of the unit.

The available water capacity is low in the Ouiatenon soil. Permeability is rapid in the upper part of the underlying material and very rapid in the lower part. Surface runoff is slow. The content of organic matter in the surface layer is moderately low.

Most areas of this soil are used for cultivated crops. Some areas are used for woodland, hay, or pasture.

This soil is fairly well suited to corn and soybeans, but damage from floodwaters can be expected. Flooding and soil blowing are major hazards, and droughtiness is a limitation. Small grain planted in the fall is subject to severe damage during periods of prolonged flooding. Late spring planting of adapted crops helps to minimize the damage or loss caused by flooding. Levees or dikes help to control flooding, but they are extremely expensive if properly constructed. Irrigation helps to overcome the droughtiness. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control soil blowing and scouring by floodwater, reduce the evaporation rate, and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems. It is also well suited to spring moldboard and spring chisel tillage systems if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as smooth bromegrass and alfalfa, for hay and pasture, but prolonged flooding can damage these crops from late fall through spring. Flooding and soil blowing are hazards, and droughtiness is a limitation. Levees and dikes help to control flooding. Growing grasses and legumes helps to control soil blowing. Irrigation helps to overcome the droughtiness. Deep-rooted legumes and drought-tolerant species should be selected. Overgrazing reduces plant densities. Proper stocking rates, rotation grazing, and restricted use during the summer help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is moderate. The occasional flooding can delay planting and harvesting. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of the flooding, this soil is generally unsuited to use as a site for dwellings. The flooding is also a severe limitation on sites for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by flooding.

The land capability classification is IIIs. The woodland ordination symbol is 6A.

Oy—Ouiatenon fine sandy loam, sandy substratum, frequently flooded. This nearly level, very deep, somewhat excessively drained soil is on flood plains. It is subject to frequent flooding for brief or long periods during the winter and spring. Individual areas are elongated or irregularly shaped and range from 3 to 120 acres in size.

Typically, the surface layer is very dark grayish brown fine sandy loam about 9 inches thick. The subsurface layer also is very dark grayish brown fine sandy loam. It is about 4 inches thick. The underlying material to a depth of 60 inches or more is dark brown loamy sand and sand. In places the underlying material has more clay. In a few small areas the underlying material contains gravel. In some areas the surface layer is lighter colored.

Included with this soil in mapping are the well drained Battleground and Lash soils in the lower lying areas on flood plains. These soils make up about 15 percent of the unit.

The available water capacity is low in the Ouiatenon soil. Permeability is rapid. Surface runoff is slow. The

content of organic matter in the surface layer is moderate.

Most areas of this soil are used for cultivated crops. Some areas are used for woodland, hay, or pasture.

This soil is fairly well suited to corn and soybeans, but damage from floodwaters can be expected. Flooding and soil blowing are major hazards, and droughtiness is a limitation. Small grain planted in the fall is subject to severe damage during periods of prolonged flooding. Late spring planting of adapted crops helps to minimize the damage or loss caused by flooding. Levees or dikes help to control flooding, but they are extremely expensive if properly constructed. Irrigation helps to overcome the droughtiness. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control soil blowing and scouring by floodwater, reduce the evaporation rate, and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems. It is also well suited to spring moldboard and spring chisel tillage systems if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture, but prolonged flooding can damage these crops from late fall to spring. Flooding and soil blowing are hazards, and droughtiness is a limitation. Levees and dikes help to control flooding. Growing grasses and legumes helps to control soil blowing. Irrigation helps to overcome the droughtiness. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during the summer and during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is moderate. The frequent flooding can delay planting and harvesting. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of the flooding, this soil is generally unsuited to use as a site for dwellings. The flooding is also a severe limitation on sites for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by flooding.

The land capability classification is IIIs. The woodland ordination symbol is 6A.

Pc—Palms muck, drained. This nearly level, very deep, very poorly drained soil is in depressions on outwash plains, terraces, recessional moraines, and till plains. It is frequently ponded by surface runoff from adjacent areas. Individual areas are irregular in shape and range from 2 to 60 acres in size.

Typically, the surface layer is black muck about 10 inches thick. Below this, to a depth of 36 inches, is friable muck. It is very dark grayish brown in the upper part and dark gray in the lower part. The underlying material to a depth of 60 inches or more is dark gray silt loam. In places an overwash of mineral material has been mixed with the surface layer. In a few small areas, mineral layers are within a depth of 16 inches. In some places the organic material is more than 50 inches thick or is underlain by coprogenous earth.

Included with this soil in mapping are the very poorly drained Mahalasville, Treaty, and Pella soils and the poorly drained Drummer soils in the slightly higher landscape positions at the edges of deep depressions. These soils formed in mineral material. Also included are some areas that have not been drained. Included areas make up about 15 percent of the unit.

The available water capacity is very high in the Palms soil. Permeability is moderate or moderately rapid in the organic material and moderate in the underlying material. Surface runoff is very slow or ponded. The content of organic matter in the surface layer is very high. The water table is at or above the surface from late fall through spring.

Most areas of this soil are used for cultivated crops. A few areas are idle land or are used for hay, pasture, or woodland.

This soil is fairly well suited to corn and soybeans. Wetness is a major limitation, and ponding and soil blowing are major hazards. Small grain planted in the fall is subject to severe damage during periods of prolonged ponding. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage that leaves a protective cover of crop residue on the surface, planting buffer strips or vegetative barriers, or using a combination of these practices or by maintaining a permanent cover of vegetation. This soil is well suited to spring moldboard or spring chisel tillage systems if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. Wetness is a limitation, and ponding and soil blowing are hazards. Growing grasses and legumes helps to control soil blowing. Shallow surface drains and subsurface drains can be used to remove excess water

if adequate outlets are available. Overgrazing reduces plant density. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is poorly suited to trees. The main management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. The equipment limitation is caused by wetness. The wetness can be overcome by performing woodland management activities during periods when the soil is relatively dry or is frozen. Site preparation, special planting stock, and overstocking help to overcome seedling mortality. Species that tolerate wetness should be planted. Using harvest methods that do not leave the remaining trees isolated or widely spaced helps to overcome the windthrow hazard. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of subsidence and the ponding, this soil is generally unsuited to use as a site for dwellings. Because of the ponding, subsidence, and the potential for frost action, the soil is severely limited as a site for local roads and streets. Replacing the organic material with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by ponding and by frost action.

The land capability classification is IIIw. The woodland ordination symbol is 2W.

Pd—Palms muck, gravelly substratum, undrained. This nearly level, very poorly drained soil is in depressions on glacial troughs and terraces. It is deep over gravelly coarse sand. It is frequently ponded by surface runoff from adjacent areas. Individual areas are irregular in shape and range from 2 to 40 acres in size.

Typically, the surface layer is black muck about 7 inches thick. Organic material extends to a depth of 42 inches. It is friable. The upper part is black muck, and the lower part is black muck that has thin strata of fine sand. The underlying material to a depth of 60 inches or more is gray gravelly coarse sand. In some places the soil has layers of fibers that are not as well decomposed. In other places an overwash of mineral material has been mixed with the surface layer. In a few small areas, mineral material is within a depth of 16 inches. In places the organic material is more than 50 inches thick or is underlain by coprogenous earth.

Included with this soil in mapping are areas of the very poorly drained Mahalasville soils that have a gravelly substratum. These soils are in the slightly higher landscape positions at the edge of depressions. They formed in mineral material. They make up about 15 percent of the unit.

The available water capacity is very high in the Palms soil. Permeability is moderately rapid in the organic material and very rapid in the underlying material. Surface runoff is very slow or ponded. The content of organic matter in the surface layer is very high. The water table is at or above the surface from late fall through spring.

Most areas of this soil are undrained. They are idle land or are used as woodland.

Because of wetness and ponding, this soil is generally unsuited to cultivated crops and to hay crops and is poorly suited to pasture.

This soil is poorly suited to trees. The main management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. The equipment limitation is caused by wetness. The wetness can be overcome by performing woodland management activities during periods when the soil is relatively dry or is frozen. Site preparation, special planting stock, and overstocking help to overcome seedling mortality. Species that tolerate wetness should be planted. Using harvest methods that do not leave the remaining trees isolated or widely spaced helps to overcome the windthrow hazard. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of the ponding and subsidence, this soil is generally unsuited to use as a site for dwellings and is severely limited as a site for local roads and streets. Replacing the organic material with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by ponding.

The land capability classification is Vw. The woodland ordination symbol is 2W.

Pg—Pella silty clay loam, pothole. This nearly level, very deep, very poorly drained soil is in potholes on outwash plains and till plains. It is frequently ponded by surface runoff from adjacent areas. Individual areas are irregular in shape and range from 2 to 200 acres in size.

Typically, the surface layer is black silty clay loam about 10 inches thick. The subsurface layer is black, firm silty clay loam about 5 inches thick. The subsoil is about 16 inches thick. It is olive gray, mottled, firm silty clay loam and silt loam. The underlying material to a

depth of 60 inches or more is grayish brown, mottled silt loam. It has strata of gravelly sandy loam in the lower part. In places the underlying material is loamy sand or gravelly loamy sand. In a few small areas the subsoil has more clay. In some areas the dark surface layer is more than 24 inches thick. In other areas glacial till is at a depth of less than 60 inches.

Included with this soil in mapping are small areas of the very poorly drained Mahalasville and Treaty soils and the poorly drained Drummer soils. These soils are in the slightly higher landscape positions at the edges of potholes. Mahalasville and Treaty soils have a solum that is more than 40 inches thick. Included soils make up about 10 percent of the unit.

The available water capacity is high in the Pella soil. Permeability is moderate. Surface runoff is very slow or ponded. The content of organic matter in the surface layer is high. The water table is at or above the surface, mainly during the winter and spring. The surface layer becomes cloddy and hard to work if tilled when too wet.

Most areas of this soil are used for cultivated crops. A few areas are used for hay or pasture.

This soil is poorly suited to corn and soybeans. Wetness and the ponding are major management concerns. Crusting is also a concern. Small grain planted in the fall is subject to severe damage during periods of prolonged ponding. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve soil tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to fall moldboard, fall chisel, and ridge-till tillage systems.

This soil is fairly well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay. It is well suited to pasture. The wetness and the ponding are concerns. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

Because of the ponding, this soil is generally unsuited to use as a site for dwellings. Because of low strength, the ponding, and the potential for frost action, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by ponding and by frost action.

The land capability classification is IVw. No woodland ordination symbol is assigned.

Pk—Peotone silty clay loam, pothole. This nearly level, very deep, very poorly drained soil is in potholes on recessional moraines and till plains. It is frequently ponded by surface runoff from adjacent areas. Individual areas are irregular in shape and range from 2 to 40 acres in size.

Typically, the surface layer is very dark gray silty clay loam about 10 inches thick. The subsurface layer is about 19 inches thick. It is black silty clay loam in the upper part and black silty clay in the lower part. The subsoil is about 26 inches thick. It is black, mottled, very firm silty clay in the upper part and dark grayish brown, mottled, very firm silty clay and firm silty clay loam in the lower part. The underlying material to a depth of 60 inches or more is olive gray silty clay loam. In places the soil has an overwash of lighter colored silt loam. In a few areas the subsoil has less clay. In some places the dark surface soil is less than 24 inches thick.

Included with this soil in mapping are small areas of the poorly drained Drummer soils. These soils are in the slightly higher landscape positions at the edges of potholes. They make up about 10 percent of the map unit.

The available water capacity is high in the Peotone soil. Permeability is moderately slow and slow in the solum and moderately slow in the underlying material. Surface runoff is very slow or ponded. The content of organic matter in the surface layer is high. The water table is at or above the surface, mainly during the winter and spring. The surface layer becomes cloddy and hard to work if tilled when too wet.

Most areas of this soil are used for cultivated crops. A few areas are used for hay or pasture.

This soil is poorly suited to corn and soybeans. Wetness and the ponding are major management concerns. Crusting is also a concern. Small grain planted in the fall is subject to severe damage during periods of prolonged ponding. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth,

infiltration, aeration, and the content of organic matter. This soil is well suited to fall moldboard, fall chisel, and ridge-till tillage systems.

This soil is fairly well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay. It is well suited to pasture. The wetness and the ponding are concerns. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

Because of the ponding and the shrink-swell potential, this soil is generally unsuited to use as a site for dwellings. Because of the shrink-swell potential, low strength, and the ponding, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by ponding.

The land capability classification is IVw. No woodland ordination symbol is assigned.

PmB—Pinevillage gravelly sandy loam, 2 to 8 percent slopes, rarely flooded. This gently sloping and moderately sloping, very deep, well drained soil is on flood plains. It is subject to rare flooding for brief periods. Individual areas are irregular in shape and range from 2 to 40 acres in size.

Typically, the surface layer is dark brown gravelly sandy loam about 8 inches thick. The underlying material extends to a depth of 60 inches or more. It is dark brown gravelly sandy loam and very gravelly sandy loam in the upper part, dark brown gravelly loam in the next part, and dark yellowish brown gravelly loamy sand in the lower part. In places the underlying material has more clay. In a few areas the underlying material has less gravel. In some places the surface layer is thicker and darker. In a few areas the upper part of the underlying material has less clay and more sand.

Included with this soil in mapping are the well drained Lash, somewhat poorly drained Tice, and very poorly drained Sawabash soils. These soils are in the lower areas on flood plains. Lash soils have less gravel in the subsoil and underlying material than the Pinevillage soil. Also included are soils that have a cobbly surface layer. Included soils make up about 15 percent of the unit.

The available water capacity is low in the Pinevillage soil. Permeability is moderately rapid. Surface runoff is medium. The content of organic matter in the surface layer is moderately low. The gravelly surface layer hinders tillage.

Most areas of this soil are used as woodland or for cultivated crops. Some areas are used for hay or pasture.

This soil is poorly suited to corn, soybeans, and small grain. Erosion is a hazard, and droughtiness is a limitation. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. Irrigation helps to overcome the droughtiness. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion, reduce the evaporation rate, and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems and to spring chisel if the new crop is planted into corn residue.

This soil is fairly well suited to grasses and legumes, such as smooth bromegrass and alfalfa, for hay. It is well suited to pasture. Erosion is a hazard. Growing grasses and legumes helps to control runoff and erosion. Droughtiness is a limitation. Irrigation helps to overcome the droughtiness. Deep-rooted legumes and drought-tolerant species should be selected. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during the summer and during wet periods help to keep the pasture in good condition.

This soil is fairly well suited to trees. The main management concerns are the equipment limitation and seedling mortality. Planting seedlings by hand may be necessary because cobbles on the surface restrict the use of mechanical planters. Site preparation, special planting stock, and overstocking help to overcome seedling mortality. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of the flooding, this soil is generally unsuited to use as a site for dwellings. Because of the flooding, the potential for frost action, and large stones, the soil is moderately limited as a site for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by flooding and by frost action.

The land capability classification is IVs. The

woodland ordination symbol is 3F.

Pt—Pits, gravel. These nearly level to very steep, excessively drained to well drained areas are on uplands, terraces, and flood plains. The Pits were formed when gravel was mined from these areas. They range from 2 to 450 acres in size.

In most areas, the soil material has been removed and sand and gravel are exposed. In some areas, soil material has washed into the Pits and sparse vegetation is growing.

Included in mapping are piles of overburden, which have a cover of sparse vegetation. Also included, in the uplands, are small areas where glacial till has been exposed. A few of the Pits contain water in the lowest part.

The available water capacity is very low in the Pits. Permeability is rapid or very rapid. The content of organic matter is very low. Reaction ranges from neutral to moderately alkaline.

Most areas of this unit are barren, and erosion is a hazard. Major land reclamation is needed before the soils can support adequate vegetation.

Onsite investigation is needed if areas of this unit are to be used for building sites or local roads and streets. Major land reclamation is generally required.

No land capability classification or woodland ordination symbol is assigned.

RaB2—Rainsville silt loam, 2 to 6 percent slopes, eroded. This gently sloping, moderately well drained soil is on till plains and recessional moraines. It is deep over compact glacial till. Individual areas are irregular in shape and range from 2 to 80 acres in size.

Typically, the surface layer is brown silt loam about 9 inches thick. It contains dark yellowish brown silty clay loam from the subsoil. The subsoil is about 45 inches thick. The upper part is dark yellowish brown, firm silty clay loam and clay loam; the next part is dark yellowish brown, firm sandy loam; and the lower part is dark yellowish brown and light olive brown, mottled, firm clay loam and loam. The underlying material to a depth of 60 inches or more is light olive brown loam. In a few places the soil has more than 20 inches of silty material. In some areas the depth to glacial till is more than 60 inches or less than 45 inches. In other areas the depth to mottles is more than 48 inches. In places the surface layer is darker.

Included with this soil in mapping are the somewhat poorly drained Fincastle and Starks soils on toe slopes. Also included are the well drained Miami soils on shoulder slopes and summits of knolls. Included soils make up about 15 percent of the unit.

The available water capacity is high in the Rainsville soil. Permeability is moderate in the upper part of the solum, moderately slow in the lower part of the solum, and slow in the underlying material. Surface runoff is medium. The content of organic matter in the surface layer is moderately low. The water table is at a depth of 2.5 to 4.0 feet in winter and spring.

Most areas of this soil are used for cultivated crops. Some areas are used for hay or pasture. A few small areas are used as woodland.

This soil is well suited to corn, soybeans, and small grain. Erosion is a hazard. Crusting is also a concern. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion, help to prevent crusting, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems. It is also well suited to spring moldboard and chisel tillage systems if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Erosion is a hazard. Growing grasses and legumes helps to control runoff and erosion. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

This soil is suitable for use as a site for dwellings without basements. The wetness is a moderate limitation on sites for dwellings with basements. Installing subsurface drains helps to lower the water table. Because of low strength, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic.

The land capability classification is IIe. The woodland ordination symbol is 5A.

RcA—Raub-Brenton complex, 0 to 1 percent slopes. This map unit consists of nearly level, somewhat poorly drained soils on till plains. The Raub

soil is deep over compact glacial till, and the Brenton soil is very deep. Individual areas of this unit are irregular in shape and range from 2 to 100 acres in size. They are about 45 percent Raub soil and 35 percent Brenton soil. The two soils occur as areas so intricately mixed that it was not practical to map them separately.

Typically, the surface layer of the Raub soil is very dark grayish brown silt loam about 11 inches thick. The subsoil is about 42 inches thick. It is light olive brown and grayish brown, mottled, firm silty clay loam in the upper part; grayish brown, mottled, firm silt loam in the next part; and grayish brown and light olive brown, mottled, firm loam in the lower part. The underlying material to a depth of 60 inches or more is light olive brown, mottled loam. In places the dark surface layer is less than 10 inches thick. In some areas the underlying compact glacial till is at a depth of less than 40 inches. In a few small areas the soil has more than 40 inches of silty material. In some places stratified material is above the underlying glacial till.

Typically, the surface layer of the Brenton soil is very dark gray silt loam about 11 inches thick. The subsoil is about 41 inches thick. The upper part is olive brown, mottled, firm silty clay loam. The lower part is light olive brown, mottled, firm silt loam that has pockets and strata of sand and sandy loam. The underlying material to a depth of 60 inches or more is light olive brown, mottled silt loam that has strata of sand. In places the dark surface layer is less than 10 inches thick. In some areas glacial till is at a depth of less than 60 inches. In a few small areas the soil has more than 40 inches of silty material.

Included with these soils in mapping are the poorly drained Drummer soils in depressions and drainageways. Also included are the moderately well drained Throckmorton soils on slight rises. Included soils make up about 15 percent of the unit.

The available water capacity is high in the Raub and Brenton soils. Permeability is moderate in the upper part of the solum in the Raub soil, moderately slow in the lower part of the solum, and slow in the underlying material. It is moderate in the Brenton soil. Surface runoff is slow on both soils. The content of organic matter in the surface layer is moderate. The water table in both soils is at a depth of 1 to 3 feet in winter and spring.

Most areas are used for cultivated crops. Some areas are used for hay or pasture.

These soils are well suited to corn, soybeans, and small grain. Wetness is a major limitation. Crusting is also a concern. Subsurface drains can be used to remove excess water if adequate outlets are available. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. These soils are well suited to moldboard, fall chisel, no-till, and ridge-till tillage systems.

These soils are well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. Wetness is a limitation. Subsurface drains can be used to remove excess water if adequate outlets are available. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soils are too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

The wetness is a severe limitation if these soils are used as sites for dwellings. Installing subsurface drains helps to lower the water table. Constructing buildings on raised, well compacted fill material also helps to overcome the wetness. Because of low strength and the potential for frost action, the soils are severely limited as sites for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soils to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is IIw. No woodland ordination symbol is assigned.

RdA—Richardville silt loam, 0 to 2 percent slopes. This nearly level, very deep, well drained soil is on till plains and recessional moraines. Individual areas are irregular in shape and range from 2 to 120 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsoil is about 47 inches thick. It is dark yellowish brown, firm silty clay loam and clay loam in the upper part and yellowish brown, friable fine sandy loam in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown fine sandy loam. In some areas the surface layer is darker. In places the underlying glacial till is at a depth of less than 40 inches. In a few areas the lower part of the subsoil has stratified sandy and gravelly material.

Included with this soil in mapping are the well drained Miami soils in the more sloping areas. These soils have a solum that is less than 40 inches thick. Also included are the somewhat poorly drained Fincastle and Starks soils at the slightly lower

elevations and in swales and small areas of the moderately well drained Rockfield soils in landscape positions similar to those of the Richardville soil. Included soils make up about 15 percent of the unit.

The available water capacity is high in the Richardville soil. Permeability is moderate. Surface runoff is slow. The content of organic matter in the surface layer is moderately low.

Most areas of this soil are used for cultivated crops. Some areas are used for hay or pasture. A few small areas are used as woodland.

This soil is well suited to corn, soybeans, and small grain. Crusting is a concern. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to moldboard, chisel, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is severe. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

The shrink-swell potential is a moderate limitation if this soil is used as a site for dwellings. Foundations, footings, and basement walls should be strengthened. Backfilling with coarser material helps to prevent the structural damage caused by shrinking and swelling of the soil. Because of the shrink-swell potential and the potential for frost action, the soil is moderately limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by frost action.

The land capability classification is I. The woodland ordination symbol is 7A.

RdB2—Richardville silt loam, 2 to 6 percent slopes, eroded. This gently sloping, very deep, well drained soil is on rises and breaks along drainageways on till plains and recessional moraines. Individual areas are irregular in shape and range from 2 to 80 acres in size.

Typically, the surface layer is dark brown silt loam about 7 inches thick. It contains dark brown silty clay loam from the subsoil. The subsoil is about 44 inches thick. It is dark brown, firm clay loam and sandy clay loam in the upper part and dark yellowish brown, firm sandy clay loam in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown fine sandy loam. In some places the underlying glacial till is at a depth of less than 40 inches. In a few areas stratified sandy and gravelly material is in the lower part of the subsoil. In a few places the upper part of the subsoil has less clay and more sand. In places the surface layer is darker.

Included with this soil in mapping are the well drained Miami soils in the more sloping areas. These soils have a solum that is less than 40 inches thick. Also included are small areas of the somewhat poorly drained Fincastle and Starks soils along drainageways, on toe slopes, and in slight depressions and small severely eroded areas that have a surface soil of silty clay loam or clay loam. Included soils make up about 12 percent of the unit.

The available water capacity is high in the Richardville soil. Permeability is moderate. Surface runoff is medium. The content of organic matter in the surface layer is moderately low.

Most areas of this unit are used for cultivated crops. Some areas are used for hay, pasture, or woodland.

This soil is well suited to corn, soybeans, and small grain. Erosion is a hazard. Crusting is also a concern. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion, help to prevent crusting, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems. It is also well suited to spring moldboard and chisel tillage systems if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Erosion is a hazard. Growing grasses and legumes helps to control runoff and erosion. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is severe. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

The shrink-swell potential is a moderate limitation if this soil is used as a site for dwellings. Foundations, footings, and basement walls should be strengthened. Backfilling with coarser material helps to prevent the structural damage caused by shrinking and swelling of the soil. Because of the shrink-swell potential and the potential for frost action, the soil is moderately limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by frost action.

The land capability classification is IIe. The woodland ordination symbol is 7A.

RdC2—Richardville silt loam, 6 to 12 percent slopes, eroded. This moderately sloping, very deep, well drained soil is on breaks along drainageways on till plains and recessional moraines. Individual areas are irregular in shape and range from 2 to 10 acres in size.

Typically, the surface layer is dark brown silt loam about 8 inches thick. It contains yellowish brown silty clay loam from the subsoil. The subsoil is about 40 inches thick. It is yellowish brown, firm silty clay loam and dark yellowish brown, firm clay loam in the upper part and yellowish brown, firm clay loam in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown fine sandy loam. In some places the underlying glacial till is at a depth of less than 40 inches. In a few areas the lower part of the subsoil has stratified sandy and gravelly material. In a few places the upper part of the subsoil has less clay and more sand. In places the surface layer is darker.

Included with this soil in mapping are the well drained Miami soils in the more sloping areas. These soils have a solum that is less than 40 inches thick. Also included are small areas of the somewhat poorly drained Fincastle and Starks soils along drainageways, on toe slopes, and in slight depressions and small severely eroded areas that have a surface soil of silty clay loam or clay loam. Included soils make up about 12 percent of the unit.

The available water capacity is high in the Richardville soil. Permeability is moderate. Surface runoff is medium. The content of organic matter in the surface layer is moderately low.

Most areas of this unit are used for hay or pasture. Some areas are used for cultivated crops or as woodland.

This soil is fairly well suited to corn, soybeans, and small grain. Erosion is a hazard. Crusting is also a concern. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion, help to prevent crusting, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems and to spring chisel if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Erosion is a hazard. Growing grasses and legumes helps to control runoff and erosion. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is severe. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

The shrink-swell potential and the slope are moderate limitations if this soil is used as a site for dwellings. Foundations, footings, and basement walls should be strengthened. Backfilling with coarser material helps to prevent the structural damage caused by shrinking and swelling of the soil. The buildings should be designed so that they conform to the natural slope of the land. Because of the shrink-swell potential, the slope, and the potential for frost action, the soil is moderately limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Where possible, constructing the roads on the contour reduces the amount of land grading needed to overcome the slope. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is IIIe. The woodland ordination symbol is 7A.

RoB—Rockfield silt loam, 1 to 3 percent slopes. This nearly level and gently sloping, moderately well drained soil is on rises on till plains. It is deep or very deep over compact glacial till. Individual areas are irregular in shape and range from 2 to 40 acres in size.

Typically, the surface layer is dark brown silt loam about 10 inches thick. The subsoil is about 57 inches thick. The upper part is dark yellowish brown, firm silty clay loam; the next part is dark yellowish brown, mottled, firm clay loam; and the lower part is light olive brown, mottled, firm loam. The underlying material to a depth of 80 inches or more is light olive brown, mottled loam. In places the surface layer is darker. In a few areas no outwash material is above the glacial till. In a few places the soil has strata of sandy material above the glacial till. In some areas the glacial till is fine sandy loam. In other areas the silty material is less than 24 inches thick.

Included with this soil in mapping are small areas of the somewhat poorly drained Fincastle and Starks soils in the more level landscape positions and in slight depressions. Also included are the well drained Miami soils on rises and in the more sloping areas and a few areas of the very poorly drained Mahalasville and Treaty soils in depressions and drainageways. Included soils make up about 15 percent of the unit.

The available water capacity is high in the Rockfield soil. Permeability is moderate in the upper part of the solum, moderately slow in the lower part of the solum, and slow in the underlying material. Surface runoff is medium. The content of organic matter in the surface layer is moderately low. The water table is at a depth of 2.5 to 4.0 feet, mainly in winter and early spring.

Most areas of this soil are used for cultivated crops. Some areas are used for hay, pasture, or woodland.

This soil is well suited to corn, soybeans, and small grain. Erosion is a hazard. Crusting is also a concern. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion, help to prevent crusting, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems. It is also well suited to spring moldboard and chisel tillage systems if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Erosion is a hazard. Growing grasses and legumes helps to control runoff and erosion. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

The shrink-swell potential is a moderate limitation if this soil is used as a site for dwellings. Also, the wetness is a moderate limitation on sites for dwellings with basements. Foundations, footings, and basement walls should be strengthened. Backfilling with coarser material helps to prevent the structural damage caused by shrinking and swelling of the soil. Installing subsurface drains helps to lower the water table. Because of low strength and the potential for frost action, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is IIe. The woodland ordination symbol is 8A.

RsF—Rodman gravelly loam, 25 to 60 percent slopes. This steep and very steep, excessively drained soil is on breaks of outwash plains and stream terraces. It is shallow over very gravelly coarse sand and coarse sand. Individual areas are long and narrow and range from 2 to 200 acres in size.

Typically, the surface layer is very dark gray gravelly loam about 5 inches thick. The subsurface layer is about 10 inches thick. It is very dark grayish brown gravelly loam in the upper part and dark brown, very friable very gravelly loamy coarse sand in the lower part. The underlying material to a depth of 60 inches or more is dark yellowish brown, stratified very gravelly coarse sand and coarse sand. In a few areas the underlying, stratified very gravelly coarse sand and coarse sand are at a depth of more than 15 inches or are exposed at the surface.

Included with this soil in mapping are the well drained Elston and Kalamazoo soils on the less sloping upper part of terrace breaks and narrow ridgetops. Also included are the well drained Strawn soils in landscape positions similar to those of the Rodman soil. Included soils make up about 15 percent of the unit.

The available water capacity is low in the Rodman

soil. Permeability is very rapid. Surface runoff also is very rapid. The content of organic matter in the surface layer is moderate.

Most areas of this soil are used as woodland. A few small areas are used for pasture.

This soil is generally unsuited to cultivated crops. Erosion is a severe hazard. The slope makes the use of standard farm machinery difficult.

This soil is generally unsuited to grasses and legumes for hay and is poorly suited to pasture. It is droughty and produces little forage in summer. The slope makes the use of standard farm machinery difficult.

This soil is poorly suited to trees. The main management concerns are the hazard of erosion, the equipment limitation, and seedling mortality. Using selective cutting rather than clear cutting, establishing haul roads on the contour, and preserving as much understory vegetation as possible help to control erosion. Special operations, such as yarding logs uphill with cable, may be needed to minimize the use of rubber-tired and crawler tractors. Site preparation, special planting stock, and overstocking help to overcome seedling mortality. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of the slope, this soil is generally unsuited to use as a site for dwellings and is severely limited as a site for local roads and streets. Cuts and fills are needed. Where possible, building the roads on the contour helps to overcome the slope.

The land capability classification is VIIs. The woodland ordination symbol is 4R.

Rz—Ross silt loam, protected. This nearly level, very deep, well drained soil is on flood plains. It is protected from flooding by levees and pumps. Individual areas are irregular in shape and range from 3 to 40 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 10 inches thick. The subsurface layer is very dark grayish brown, friable silt loam about 7 inches thick. The subsoil extends to a depth of more than 60 inches. The upper part is very dark grayish brown and dark brown, friable loam, and the lower part is brown, friable sandy loam. In some places the dark surface soil and subsoil are less than 24 inches thick. In a few small areas the surface layer is calcareous. In places the lower part of the subsoil contains gravel.

Included with this soil in mapping are the well drained Allison and Battleground soils in the lower lying areas. These soils have less sand in the subsoil than the Ross soil. They make up about 10 percent of the unit.

The available water capacity is high in the Ross soil. Permeability is moderate. Surface runoff is slow. The content of organic matter in the surface layer is moderate.

Most areas of this soil are used for cultivated crops.

This soil is well suited to corn, soybeans, and small grain. Crusting is a concern. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to spring moldboard, chisel, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is moderate. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of possible flooding caused by levee failure, this soil is generally unsuitable for use as a site for dwellings. Because of low strength, the flooding, and the potential for frost action, the soil is moderately limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by flooding and by frost action.

The land capability classification is I. The woodland ordination symbol is 5A.

Sd—Saranac silty clay, gravelly substratum, occasionally flooded. This nearly level, very poorly drained soil is on flood plains. It is deep over gravelly loamy coarse sand. It is subject to occasional flooding for brief periods during the winter and spring. It is frequently ponded by surface runoff from adjacent areas. Individual areas are irregular in shape and range from 5 to 250 acres in size.

Typically, the surface layer is black silty clay about 10 inches thick. The subsurface layer is black, firm silty clay about 8 inches thick. The subsoil is about 31 inches thick. It is dark gray and gray, mottled, very firm silty clay in the upper part and grayish brown, mottled, firm silty clay loam in the lower part. The underlying material extends to a depth of 70 inches or more. The

upper part is dark gray, mottled silt loam. The lower part is light brownish gray gravelly loamy coarse sand that has strata of silt loam and gravelly loam. In a few small areas the dark surface layer is more than 24 inches thick. In some places the subsoil has less clay.

Included with this soil in mapping are the very poorly drained Cohoctah soils in the slightly higher positions on flood plains. These soils have less clay and more sand in the subsoil than the Saranac soil. Also included are the somewhat poorly drained Ceresco soils in areas adjacent to stream channels. Included soils make up about 10 percent of the unit.

The available water capacity is high in the Saranac soil. Permeability is moderately slow in the solum and rapid in the underlying material. Surface runoff is very slow or ponded. The content of organic matter in the surface layer is high. The water table is at or above the surface during the winter and spring. The surface layer becomes cloddy and hard if tilled when too wet.

Most areas of this soil are used for cultivated crops. A few areas are used as woodland.

This soil is fairly well suited to corn and soybeans, but damage from floodwaters can be expected. Wetness, the flooding, and the ponding are major management concerns. Crusting is also a concern. Levees or dikes help to control flooding, but they are extremely expensive if properly constructed. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control scouring by floodwater, help to prevent crusting, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to spring chisel and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture, but prolonged flooding can damage these crops in winter and spring. The wetness, the ponding, and the flooding are concerns. Levees and dikes help to control flooding. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. The main management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. The flooding and the wetness can delay planting and harvesting. Woodland management activities should be performed during periods when the soil is relatively dry or is frozen. Site preparation, special planting stock, and overstocking help to overcome seedling mortality. Species that tolerate wetness should be planted. Using harvest methods that do not leave the remaining trees isolated or widely spaced helps to overcome the windthrow hazard. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of the flooding and the ponding, this soil is generally unsuited to use as a site for dwellings. Because of low strength, the flooding, and the ponding, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by flooding and by frost action.

The land capability classification is IIIw. The woodland ordination symbol is 5W.

Sf—Sawabash silty clay loam, frequently flooded. This nearly level, very deep, very poorly drained soil is on flood plains. It is subject to frequent flooding for brief or long periods from fall through spring. It is also frequently ponded by surface runoff from adjacent areas. Individual areas are long and narrow or irregularly shaped and range from 3 to 70 acres in size.

Typically, the surface layer is very dark grayish brown silty clay loam about 9 inches thick. The subsurface layer is very dark grayish brown and very dark gray silty clay loam about 37 inches thick. The subsoil is dark grayish brown, mottled, firm silty clay loam about 9 inches thick. The underlying material to a depth of 60 inches or more is dark gray, mottled silty clay loam. In a few areas the soil has a lighter colored overwash about 7 to 20 inches thick. In places the dark surface layer is less than 36 inches thick. In some areas the surface soil and the subsoil have more sand.

Included with this soil in mapping are the somewhat poorly drained Tice and well drained Battleground soils at the higher elevations adjacent to stream channels. These soils make up about 15 percent of the unit.

The available water capacity is high in the Sawabash soil. Permeability is moderate. Surface runoff is very slow or ponded. The content of organic matter in the

surface layer is high. The water table is at or above the surface, mainly from late fall through spring.

Most areas of this soil are used for cultivated crops. Some areas are used for hay, pasture, or woodland.

This soil is fairly well suited to corn and soybeans, but damage from floodwaters can be expected. Wetness, the flooding, and the ponding are major management concerns. Levees or dikes help to control flooding, but they are extremely expensive if properly constructed. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control scouring by floodwater, help to prevent crusting, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to spring chisel and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture, but prolonged flooding can damage these crops from late fall through spring. The wetness, the ponding, and the flooding are concerns. Levees and dikes help to control flooding. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. The main management concerns are the equipment limitation, seedling mortality, and plant competition. Frequent flooding can delay planting and harvesting. The wetness can be overcome by performing woodland management activities during periods when the soil is relatively dry or is frozen. Site preparation, special planting stock, and overstocking help to overcome seedling mortality. Species that tolerate wetness should be planted. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of the flooding and the ponding, this soil is generally unsuited to use as a site for dwellings. Because of low strength, the ponding, and the flooding, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by ponding and flooding.

The land capability classification is IIIw. The woodland ordination symbol is 5W.

ShB—Shadeland silt loam, 1 to 4 percent slopes. This nearly level and gently sloping, somewhat poorly drained soil is on uplands. It is moderately deep over interbedded siltstone and shale bedrock. Individual areas are irregular in shape and range from 2 to 30 acres in size.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil is about 26 inches thick. It is brown, mottled, friable silt loam and firm silty clay loam in the upper part; brown and dark brown, mottled, firm clay loam in the next part; and strong brown, mottled, firm channery clay loam in the lower part. The underlying material to a depth of 60 inches or more is interbedded siltstone and shale bedrock. In the northeastern part of the county, the bedrock is New Albany black shale. In places bedrock is at a depth of less than 20 inches. In a few small areas, bedrock is at a depth of more than 40 inches. In places the surface layer is darker.

Included with this soil in mapping are small areas of the moderately well drained High Gap Variant soils in the more sloping positions along drainageways. Also included, in depressions and drainageways, are small areas of the very poorly drained Mahalasville soils that have a shale substratum. Included soils make up about 15 percent of the unit.

The available water capacity is moderate in the Shadeland soil. Permeability is moderate in the upper part of the solum and moderately slow in the lower part. Surface runoff is medium. The content of organic matter in the surface layer is moderately low. The water table is at a depth of 1 to 2 feet, mainly in winter and early spring.

Most areas of this soil are used for cultivated crops. Some areas are used for hay or pasture. A few small areas are used as woodland.

This soil is well suited to corn, soybeans, and small grain. Wetness is a major limitation, and erosion is a major hazard. Crusting is also a concern. Subsurface drains can be used to remove excess water if adequate outlets are available. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. Using a system of conservation tillage that leaves a protective cover of

crop residue on the surface and planting cover crops help to control erosion, help to prevent crusting, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to moldboard, fall chisel, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. The wetness and the hazard of erosion are concerns. Subsurface drains can be used to remove excess water if adequate outlets are available. Growing grasses and legumes helps to control runoff and erosion. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. The main management concerns are the equipment limitation and plant competition. The equipment limitation can be reduced by performing woodland management activities during periods when the soil is relatively dry or is frozen. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

The wetness is a severe limitation if this soil is used as a site for dwellings. Installing subsurface drains helps to lower the water table. Constructing buildings on raised, well compacted fill material also helps to overcome the wetness. Because of low strength and the potential for frost action, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is IIe. The woodland ordination symbol is 4A.

SmA—Sleeth loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on outwash plains and terraces. It is deep over gravelly sand. Individual areas are irregular in shape and range from 2 to 20 acres in size.

Typically, the surface layer is dark grayish brown loam about 10 inches thick. The subsoil is about 48 inches thick. It is brown and dark yellowish brown, mottled, firm loam in the upper part; gray, mottled, firm sandy clay loam in the next part; and dark gray and dark grayish brown, mottled, friable gravelly sandy loam and very friable gravelly loamy sand in the lower part. The underlying material to a depth of 70 inches or more is yellowish brown, mottled gravelly sand. In places the surface layer is darker. In a few small areas the surface layer and the upper part of the subsoil have less sand. In some places glacial till is within a depth of 60 inches.

Included with this soil in mapping are small areas of the well drained Kalamazoo soils on slight rises and in the more sloping areas. Also included, in depressions, are small areas of the very poorly drained Mahalasville soils that have a gravelly substratum. Included soils make up about 15 percent of the unit.

The available water capacity is high in the Sleeth soil. Permeability is moderate in the solum and very rapid in the underlying material. Surface runoff is slow. The content of organic matter in the surface layer is moderately low. The water table is at a depth of 1 to 3 feet in winter and early spring.

Most areas of this soil are used for cultivated crops. Some areas are used for hay or pasture. A few small areas are used as woodland.

This soil is well suited to corn, soybeans, and small grain. Wetness is a major limitation. Crusting is also a concern. Subsurface drains can be used to remove excess water if adequate outlets are available. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to moldboard, fall chisel, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. The wetness is a limitation. Subsurface drains can be used to remove excess water if adequate outlets are available. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is moderate. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

The wetness is a severe limitation if this soil is used as a site for dwellings. Installing subsurface drains helps to lower the water table. Constructing buildings on raised, well compacted fill material also helps to overcome the wetness. Because of low strength and the potential for frost action, the soil is severely limited as a site for local roads and streets. Strengthening the base

material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is IIw. The woodland ordination symbol is 5A.

Sn—Sloan clay loam, occasionally flooded. This nearly level, very deep, very poorly drained soil is on flood plains. It is subject to occasional flooding for brief periods from fall through spring. It is also frequently ponded by surface runoff from adjacent areas. Individual areas are long and narrow and range from 2 to 200 acres in size.

Typically, the surface layer is black clay loam about 9 inches thick. The subsurface layer also is black clay loam. It is about 7 inches thick. The subsoil is about 28 inches thick. It is grayish brown, mottled, firm loam that has thin strata of sandy loam in the lower part. The underlying material to a depth of 60 inches or more is grayish brown, mottled sandy loam and gravelly loam. In a few areas the soil has a lighter colored overwash of silt loam or loam about 7 to 20 inches thick. In a few places glacial till is within a depth of 60 inches. In some areas the dark surface soil is more than 24 inches thick. In other areas the surface layer and subsoil have less sand or clay.

Included with this soil in mapping are the very poorly drained Cohoctah soils on the wider flood plains in areas downstream. These soils have less clay in the subsoil than the Sloan soil. They make up about 10 percent of the unit.

The available water capacity is high in the Sloan soil. Permeability is moderate. Surface runoff is very slow or ponded. The content of organic matter in the surface layer is high. The water table is at or above the surface, mainly during the winter and spring. The surface layer becomes cloddy and hard to work if tilled when too wet.

Most areas of this soil are used for cultivated crops. Some areas are used for hay, pasture, or woodland.

This soil is fairly well suited to corn and soybeans, but damage from floodwater can be expected. Wetness, the flooding, and the ponding are major management concerns. Crusting is also a concern. Levees or dikes help to control flooding, but they are extremely expensive if properly constructed. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Diverting runoff from nearby upland areas helps to minimize the ponding. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. Springs at the base of the steep breaks should be cut off with subsurface drains or diversions. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control scouring by floodwater, help to prevent crusting, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to spring chisel and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture, but prolonged flooding can damage these crops in winter and spring. Levees and dikes help to control flooding. The wetness, the flooding, and the ponding are concerns. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. The main management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Occasional flooding can delay planting and harvesting. The wetness can be overcome by performing woodland management activities during periods when the soil is relatively dry or is frozen. Site preparation, special planting stock, and overstocking help to overcome seedling mortality. Species that tolerate wetness should be planted. Using harvest methods that do not leave the remaining trees isolated or widely spaced helps to overcome the windthrow hazard. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of the flooding and the ponding, this soil is generally unsuited to use as a site for dwellings. Because of the ponding, the flooding, and low strength, the soil is severely limited as a site for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by ponding, flooding, and low strength.

The land capability classification is IIIw. The woodland ordination symbol is 5W.

So—Sloan Variant silty clay loam, occasionally flooded. This nearly level, very poorly drained soil is on flood plains. It is moderately deep over siltstone and shale bedrock. It is subject to occasional flooding for brief or long periods from fall through spring. It is also ponded by surface runoff from adjacent areas.

Individual areas are irregular in shape and range from 10 to 220 acres in size.

Typically, the surface layer is black silty clay loam about 10 inches thick. The subsoil is about 23 inches thick. The upper part is black, mottled, firm silty clay loam, and the lower part is dark grayish brown, mottled, firm very channery sandy clay loam. Weathered interbedded siltstone and shale bedrock is at a depth of about 33 inches. In places the underlying bedrock is within a depth of 20 inches. In a few small areas the bedrock is at a depth of more than 40 inches. In some places the subsoil contains less sand or channers.

Included with this soil in mapping are small areas of the somewhat poorly drained Tice and very poorly drained Sawabash soils in the slightly higher positions on the landscape. Sawabash soils have less sand in the subsoil than the Sloan Variant soil. Also, they do not have bedrock within a depth of 60 inches. Also included are soils that have a channery surface layer. Included soils make up about 5 percent of the unit.

The available water capacity is low in the Sloan Variant soil. Permeability is moderate. Surface runoff is very slow or ponded. The content of organic matter in the surface layer is high. The water table is at or above the surface during the winter and spring. The surface layer becomes cloddy and hard to work if tilled when too wet.

Most areas of this soil are used for cultivated crops. A few areas are used for hay, pasture, or woodland.

This soil is fairly well suited to corn and soybeans, but damage from floodwater can be expected. Wetness, the ponding, and the flooding are major management concerns. Crusting is also a concern. Levees or dikes help to control flooding. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. Diverting runoff from nearby upland areas helps to minimize the ponding. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to spring chisel and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture, but prolonged flooding can damage these crops in winter and spring. The wetness, the flooding, and the ponding are concerns. Levees and dikes help to control flooding. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is poorly suited to trees. The main management concerns are the equipment limitation, seedling mortality, and plant competition. The equipment limitation is caused by wetness. The wetness can be overcome by performing woodland management activities during periods when the soil is relatively dry or is frozen. Site preparation, special planting stock, and overstocking help to overcome seedling mortality. Species that tolerate wetness should be planted. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of the flooding and the ponding, this soil is generally unsuited to use as a site for dwellings. Because of the potential for frost action, the ponding, and the flooding, the soil is severely limited as a site for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by flooding, ponding, and frost action.

The land capability classification is IIIw. The woodland ordination symbol is 2W.

SrB—Sparta sand, 2 to 6 percent slopes. This gently sloping, very deep, excessively drained soil is in undulating areas on sand dunes. Individual areas are elongated or irregularly shaped and range from 2 to 40 acres in size.

Typically, the surface layer is very dark brown sand about 12 inches thick. The subsurface layer extends to a depth of 80 inches or more. It is very dark brown and dark brown, very friable sand in the upper part; dark yellowish brown and yellowish brown, very friable sand in the next part; and brown, very friable sand that has dark brown bands of loamy sand in the lower part. In places the lower part of the subsoil contains more clay or gravel. In a few small areas the subsurface layer does not have bands of loamy sand. In a few places the surface layer is lighter colored.

Included with this soil in mapping are small areas of the well drained Carmi and Elston soils and the well drained Billett soils that have a gravelly substratum. These soils are at the lower elevations. Also included are small areas that have slopes of more than 6 percent. Included areas make up about 10 percent of the unit.

The available water capacity is low in the Sparta soil. Permeability is rapid. Surface runoff is slow. The

content of organic matter in the surface layer is moderately low.

Most areas of this soil are used for cultivated crops. Some areas are used for hay, pasture, or woodland. A few areas are idle land.

This soil is poorly suited to corn, soybeans, and small grain. Soil blowing is a hazard, and droughtiness is a limitation. The hazard of soil blowing can be reduced by establishing windbreaks, using a system of conservation tillage, planting buffer strips or vegetative barriers, ridging at an angle to the prevailing wind, or using a combination of these practices or by maintaining a permanent cover of vegetation. Irrigation helps to overcome the droughtiness. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control soil blowing, reduce the evaporation rate, and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems and to spring chisel if the new crop is planted into corn residue.

This soil is fairly well suited to grasses and legumes, such as smooth bromegrass and alfalfa, for hay. It is well suited to pasture. Soil blowing is a hazard, and droughtiness is a limitation. Irrigation helps to overcome the droughtiness. Deep-rooted legumes and drought-tolerant species should be selected. Growing grasses and legumes helps to control soil blowing. Overgrazing reduces plant densities. Proper stocking rates, rotation grazing, and restricted use during the summer help to keep the pasture in good condition.

This soil is well suited to trees. The main management concern is seedling mortality. Site preparation, special planting stock, and overplanting help to overcome seedling mortality. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

This soil is suitable for use as a site for dwellings and local roads and streets.

The land capability classification is IVs. The woodland ordination symbol is 4S.

SrC—Sparta sand, 6 to 12 percent slopes. This moderately sloping, very deep, excessively drained soil is in undulating areas on sand dunes. Individual areas are elongated or irregularly shaped and range from 2 to 40 acres in size.

Typically, the surface layer is very dark brown, very friable sand about 12 inches thick. The subsurface layer extends to a depth of 80 inches or more. The upper part is yellowish brown sand, and the lower part is yellowish brown, very friable sand that has dark brown bands of loamy sand. In places the lower part of the subsoil has more clay or gravel. In a few small areas the subsurface layer does not have bands of loamy sand. In a few places the surface layer is lighter colored.

Included with this soil in mapping are small areas of the well drained Carmi and Elston soils and the well drained Billett soils that have a gravelly substratum. These soils are at the lower elevations. Also included are small areas that have slopes of more than 12 percent. Included areas make up about 10 percent of the unit.

The available water capacity is low in the Sparta soil. Permeability is rapid. Surface runoff is medium. The content of organic matter in the surface layer is moderately low.

Most areas of this soil are used for hay or pasture. Some areas are used for cultivated crops or as woodland. A few areas are idle land.

This soil is generally unsuited to corn, soybeans, and small grain. Soil blowing is a hazard, and droughtiness is a limitation.

This soil is poorly suited to grasses and legumes, such as smooth bromegrass and alfalfa, for hay. It is fairly well suited to pasture. Soil blowing is a hazard, and droughtiness is a limitation. Irrigation helps to overcome the droughtiness. Deep-rooted legumes and drought-tolerant species should be selected. Growing grasses and legumes helps to control soil blowing. Overgrazing reduces plant densities. Proper stocking rates, rotation grazing, and restricted use during the summer help to keep the pasture in good condition.

This soil is well suited to trees. The main management concern is seedling mortality. Site preparation, special planting stock, and overplanting help to overcome seedling mortality. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

The slope is a moderate limitation if this soil is used as a site for dwellings and local roads and streets. The buildings should be designed so that they conform to the natural slope of the land. Where possible, constructing the roads on the contour reduces the amount of land grading needed to overcome the slope.

The land capability classification is VIs. The woodland ordination symbol is 4S.

StC—Spinks fine sand, 6 to 12 percent slopes. This moderately sloping, very deep, well drained soil is in undulating areas on outwash plains, terraces, recessional moraines, and till plains. Individual areas are elongated or irregularly shaped and range from 2 to 20 acres in size.

Typically, the surface layer is dark brown fine sand about 9 inches thick. The subsurface layer is dark yellowish brown, very friable fine sand about 59 inches

thick. It has dark brown bands of friable loamy fine sand in the lower part. The underlying material to a depth of 80 inches or more is brown fine sand. In places the lower part of the subsoil contains less clay. In a few small areas the subsurface layer does not have bands of loamy fine sand. In a few places the surface layer is darker.

Included with this soil in mapping are areas of the well drained Alvin soils on toe slopes and in the more level areas. These soils have more clay in the upper part of the subsoil than the Spinks soil. Also included are the somewhat poorly drained Whitaker soils on toe slopes. Included soils make up about 10 percent of the unit.

The available water capacity is low in the Spinks soil. Permeability is rapid in the upper part of the solum, moderately rapid in the lower part of the solum, and rapid in the underlying material. Surface runoff is medium. The content of organic matter in the surface layer is low.

Most areas of this soil are idle land. Some areas are used for cultivated crops, hay, pasture, or woodland.

This soil is fairly well suited to cultivated crops. Water erosion and soil blowing are hazards, and droughtiness is a limitation. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. Irrigation helps to overcome the droughtiness. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion and soil blowing, reduce the evaporation rate, and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems and to spring chisel if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as smooth bromegrass and alfalfa, for hay and pasture. Water erosion and soil blowing are hazards. Droughtiness is a limitation. Irrigation helps to overcome the droughtiness. Deep-rooted legumes and drought-tolerant species should be selected. Growing grasses and legumes helps to control runoff, erosion, and soil blowing. Overgrazing reduces plant densities. Proper stocking rates, rotation grazing, and restricted use during the summer help to keep the pasture in good condition.

This soil is well suited to trees. The main management concerns are the equipment limitation and seedling mortality. Equipment tends to bog down in sandy soils when they are dry. The equipment limitation can be reduced by delaying timber harvest until the soil is moist or frozen. Site preparation, special planting stock, and overplanting help to overcome seedling mortality. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

The slope is a moderate limitation if this soil is used as a site for dwellings and local roads and streets. The buildings should be designed so that they conform to the natural slope of the land. Where possible, constructing the roads on the contour reduces the amount of land grading needed to overcome the slope.

The land capability classification is IIIe. The woodland ordination symbol is 4S.

SwA—Starks-Fincastle complex, 0 to 2 percent slopes. This map unit consists of nearly level, somewhat poorly drained soils on till plains. The Starks soil is very deep, and the Fincastle soil is deep over compact glacial till. The Fincastle soil is on slightly higher rises than the Starks soil. Individual areas of this unit are irregular in shape and range from 2 to 100 acres in size. Some broad areas are larger than 1,000 acres. The areas are about 50 percent Starks soil and 35 percent Fincastle soil. The two soils occur as areas so intricately mixed that it was not practical to map them separately.

Typically, the surface layer of the Starks soil is brown silt loam about 10 inches thick. The subsoil is about 46 inches thick. It is brown and yellowish brown, mottled, firm silty clay loam in the upper part and yellowish brown, firm silt loam and loam in the lower part. The underlying material to a depth of 70 inches or more is yellowish brown, mottled sandy loam that has thin strata of loamy sand and pockets of silt loam. In places glacial till is at a depth of less than 60 inches. In a few areas the surface layer is darker. In a few places the silty material is more than 40 inches thick.

Typically, the surface layer of the Fincastle soil is dark grayish brown silt loam about 10 inches thick. The subsoil is about 44 inches thick. It is olive brown, dark yellowish brown, and yellowish brown, mottled, firm silt loam and silty clay loam in the upper part and yellowish brown, mottled, firm clay loam and loam in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown, mottled loam. In places compact glacial till is at a depth of less than 40 inches. In a few areas the surface layer is darker. In some places the silty material is more than 40 inches thick. In other places the glacial till is fine sandy loam.

Included with these soils in mapping are the moderately well drained Rockfield soils on slight rises and in the more sloping areas along drainageways and the somewhat poorly drained Crosby soils on slight

rises. Crosby soils have more sand in the upper part of the subsoil than the major soils. Also, they have a solum that is less than 40 inches thick. Also included are small areas of the very poorly drained Treaty and Mahalasville soils in depressions and drainageways. Included soils make up about 15 percent of the unit.

The available water capacity is high in the Starks and Fincastle soils. Permeability is moderate in the Starks soil. It is moderate in the upper part of the solum in the Fincastle soil, moderately slow in the lower part of the solum, and slow in the underlying material. Surface runoff is slow on both soils. The content of organic matter in the surface layer is moderately low. The water table is at a depth of 1 to 3 feet in winter and early spring.

Most areas are used for cultivated crops. Some areas are used for hay or pasture. A few small areas are used as woodland.

These soils are well suited to corn, soybeans, and small grain. Wetness is the major limitation. Crusting is also a concern. Subsurface drains can be used to remove excess water if adequate outlets are available. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. These soils are well suited to moldboard, fall chisel, no-till, and ridge-till tillage systems.

These soils are well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. The wetness is a limitation. Subsurface drains can be used to remove excess water if adequate outlets are available. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

These soils are well suited to trees. Plant competition is moderate. Competing vegetation can be controlled by cutting, spraying, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

The wetness is a severe limitation if these soils are used as sites for dwellings. Installing subsurface drains helps to lower the water table. Constructing buildings on raised, well compacted fill material also helps to overcome the wetness. Because of low strength and the potential for frost action, the soils are severely limited as sites for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soils to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is IIw. The woodland ordination symbol is 4A.

SyF—Strawn-Rodman complex, 18 to 50 percent slopes. This map unit consists of moderately steep to very steep soils on breaks of till plains. The Strawn soil is well drained and is on the upper part of slopes. It is shallow or moderately deep over compact glacial till. The Rodman soil is excessively drained and is on the lower, steeper part of slopes. It is shallow over very gravelly coarse sand and coarse sand. Individual areas of this unit are irregular in shape and are parallel to streams. They range from 2 to 900 acres in size. They are about 50 percent Strawn soil and 35 percent Rodman soil. The two soils occur as areas so intricately mixed that it was not practical to map them separately.

Typically, the surface layer of the Strawn soil is very dark grayish brown loam about 3 inches thick. The subsurface layer is brown loam about 6 inches thick. The subsoil is dark yellowish brown, firm loam about 7 inches thick. The underlying material to a depth of 60 inches or more is yellowish brown loam. In a few areas the subsoil has less clay. In a few places the underlying compact glacial till is at a depth of more than 24 inches. In some areas the underlying glacial till is fine sandy loam or silt loam. In other areas the dark surface layer is thicker.

Typically, the surface layer of the Rodman soil is very dark gray gravelly sandy loam about 5 inches thick. The subsurface layer is about 10 inches thick. It is very dark grayish brown gravelly coarse sandy loam in the upper part and dark brown gravelly loamy coarse sand in the lower part. The underlying material to a depth of 60 inches or more is brown very gravelly coarse sand that has strata of coarse sand. In a few areas the underlying gravelly material is at a depth of more than 15 inches. In some places the underlying gravelly material is exposed at the surface.

Included with these soils in mapping are the well drained Elston soils on the lower part of side slopes. Elston soils have a solum that is more than 40 inches thick. Also included are very steep areas of well drained soils that have underlying compact glacial till at a depth of less than 10 inches and several areas where the underlying gravelly material has been bonded by calcium carbonate and other compounds into a hard mass (fig. 10). Included soils make up about 15 percent of the unit.

The available water capacity is moderate in the Strawn soil and low in the Rodman soil. Permeability is

Figure 10.—An outcropping of cemented sand and gravel in an area of Strawn-Rodman complex, 18 to 50 percent slopes.

moderate in the solum of the Strawn soil and moderately slow in the underlying material. It is very rapid in the Rodman soil. Surface runoff is very rapid on both soils. The content of organic matter in the surface layer is moderate.

Most areas of this unit are used as woodland. A few areas are used for pasture.

These soils are generally unsuited to cultivated crops and hay crops because of the slope and the severe hazard of erosion. They are poorly suited to pasture. The soils are droughty and produce little forage in the summer.

These soils are poorly suited to trees. The main management concerns are the hazard of erosion, the equipment limitation, and seedling mortality. In addition, plant competition is moderate in areas of the Strawn soil. Using selective cutting rather than clear cutting, establishing haul roads on the contour, and preserving as much understory vegetation as possible help to control erosion. Special operations, such as yarding logs uphill with a cable, may be needed to minimize the use of rubber-tired and crawler tractors. Site preparation, special planting stock, and overstocking help to overcome seedling mortality. Competing

vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of the slope, these soils are generally unsuited to use as sites for dwellings and are severely limited as sites for local roads and streets. Cuts and fills are needed. Where possible, constructing the roads on the contour helps to overcome the slope.

The land capability classification is VIIe. The woodland ordination symbol is 4R.

TbA—Tecumseh silt loam, 0 to 2 percent slopes. This nearly level, very deep, well drained soil is on till plains. Individual areas are irregular in shape and range from 3 to 450 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 10 inches thick. The subsurface layer also is very dark grayish brown silt loam. It is about 5 inches thick. The subsoil is about 50 inches thick. It is dark yellowish brown, firm silty clay loam in the upper part; dark brown, firm clay loam, sandy clay loam, and fine sandy loam in the next part; and dark yellowish brown and yellowish brown, firm loam in the lower part. The underlying material to a depth of 80 inches or more is yellowish brown fine sandy loam. In places the dark surface layer is less than 10 inches thick. In a few areas the lower part of the subsoil or the underlying material has less clay and more sand. In some places the silty material is more than 40 inches thick.

Included with this soil in mapping are areas of moderately well drained soils in the slightly lower positions on the landscape. Also included are the well drained Lauramie soils in the more sloping areas on rises and along drainageways. Lauramie soils have more sand in the upper part of the subsoil than the Tecumseh soil. Included soils make up about 10 percent of the unit.

The available water capacity is high in the Tecumseh soil. Permeability is moderate. Surface runoff is slow. The content of organic matter in the surface layer is moderate.

Most areas of this soil are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Crusting is a concern. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to moldboard, chisel, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

The shrink-swell potential is a moderate limitation if this soil is used as a site for dwellings. Foundations, footings, and basement walls should be strengthened. Backfilling with coarser material helps to prevent the structural damage caused by shrinking and swelling of the soil. Because of low strength and the potential for frost action, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is I. No woodland ordination symbol is assigned.

TcA—Thackery silt loam, 0 to 2 percent slopes. This nearly level, moderately well drained soil is on terraces and outwash plains. It is deep over gravelly sand. Individual areas are irregular in shape and range from 2 to 10 acres in size.

Typically, the surface layer is dark brown silt loam about 10 inches thick. The subsoil is about 44 inches thick. The upper part is dark yellowish brown, firm silty clay loam; the next part is dark yellowish brown, mottled, firm clay loam and sandy clay loam; and the lower part is dark brown, friable gravelly sandy loam. The underlying material to a depth of 60 inches or more is grayish brown gravelly sand. In some places the silty material is more than 20 inches thick. In a few areas glacial till is within a depth of 60 inches.

Included with this soil in mapping are the somewhat poorly drained Waynetown soils at the lower elevations. Also included are the well drained Kalamazoo and Ockley soils on rises and in the more sloping areas and a few areas, in depressions and drainageways, of the very poorly drained Mahalasville soils that have a gravelly substratum. Included soils make up about 15 percent of the unit.

The available water capacity is high in the Thackery soil. Permeability is moderate in the upper part of the solum, moderately rapid in the lower part of the solum, and very rapid in the underlying material. Surface runoff is slow. The content of organic matter in the surface layer is moderately low. The water table is at a depth of 2.0 to 3.5 feet in winter and early spring.

Most areas of this soil are used for cultivated crops. A few areas are used for hay, pasture, or woodland.

This soil is well suited to corn, soybeans, and small grain. Crusting is a concern. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to moldboard, chisel, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is severe. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

The wetness and the shrink-swell potential are moderate limitations if this soil is used as a site for dwellings without basements. The wetness is a severe limitation on sites for dwellings with basements. Foundations, footings, and basement walls should be strengthened. Installing subsurface drains helps to lower the water table. Constructing buildings on raised, well compacted fill material also helps to overcome the wetness. Backfilling with coarser material helps to prevent the structural damage caused by shrinking and swelling of the soil. Because of the potential for frost action, the soil is severely limited as a site for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is I. The woodland ordination symbol is 5A.

TfB—Throckmorton silt loam, 1 to 3 percent slopes. This nearly level and gently sloping, moderately well drained soil is on recessional moraines and till plains. It is deep over compact glacial till. Individual areas are irregular in shape and range from 2 to 100 acres in size.

Typically, the surface layer is very dark gray silt loam about 9 inches thick. The subsoil is about 49 inches thick. The upper part is dark brown, firm silt loam and dark yellowish brown, firm silty clay loam; the next part is yellowish brown, mottled, firm silty clay loam and dark yellowish brown, mottled, firm clay loam; and the lower part is dark brown, mottled, firm sandy loam and brown, mottled, firm loam. The underlying material to a depth of 65 inches or more is yellowish brown, mottled loam. In some places the dark surface layer is 10 or more inches thick. In a few areas sandy material is above the underlying glacial till. In some areas the surface layer is lighter colored. In other areas the underlying compact glacial till is within a depth of 40 inches. In a few places the thickness of the silty material is more than 40 inches or less than 24 inches.

Included with this soil in mapping are small areas of the somewhat poorly drained Toronto and Millbrook soils and the well drained Mellott and Octagon soils. Toronto and Millbrook soils are in the more level areas and in depressions. Mellott soils are at the slightly higher elevations. Octagon soils are in the more sloping areas. Also included are a few areas of the poorly drained Drummer soils in depressions and drainageways. Included soils make up about 15 percent of the unit.

The available water capacity is high in the Throckmorton soil. Permeability is moderate in the upper part of the solum, moderately slow in the lower part of the solum, and slow in the underlying material. Surface runoff is medium. The content of organic matter in the surface layer is moderate. The water table is at a depth of 2.5 to 4.0 feet, mainly in winter and spring.

Most areas of this soil are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Erosion is a hazard. Crusting is also a concern. Erosion and runoff can be controlled by diversions, terraces, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion, help to prevent crusting, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to no-till and ridge-till tillage systems. It is also well suited to spring moldboard and chisel tillage systems if the new crop is planted into corn residue.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Erosion is a hazard. Growing grasses and legumes helps to control runoff and erosion. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

The shrink-swell potential is a moderate limitation if this soil is used as a site for dwellings. In addition, the wetness is a moderate limitation on sites for dwellings with basements. Foundations, footings, and basement

walls should be strengthened. Backfilling with coarser material helps to prevent the structural damage caused by shrinking and swelling of the soil. Installing subsurface drains helps to lower the water table. Because of low strength and the potential for frost action, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is IIe. No woodland ordination symbol is assigned.

Tg—Tice silty clay loam, frequently flooded. This nearly level, very deep, somewhat poorly drained soil is on flood plains. It is subject to frequent flooding for very brief to long periods during the winter and spring. Individual areas are long and narrow and range from 2 to 60 acres in size.

Typically, the surface soil is very dark grayish brown silty clay loam about 14 inches thick. The subsoil is dark brown, mottled, firm silty clay loam about 36 inches thick. The underlying material to a depth of 60 inches or more is yellowish brown loam. In places the dark surface layer is more than 20 inches thick. In some areas the upper part of the subsoil has more sand. In a few places the surface layer and underlying material are calcareous throughout.

Included with this soil in mapping are the well drained Battleground soils in the higher areas. Also included are the very poorly drained Sawabash soils at the slightly lower elevations adjacent to uplands. Included soils make up about 15 percent of the unit.

The available water capacity is high in the Tice soil. Permeability is moderate. Surface runoff is slow. The content of organic matter in the surface layer is moderate. The water table is at a depth of 1.5 to 3.0 feet, mainly from late fall through spring.

Most areas of this soil are used for cultivated crops. Some areas are used for hay, pasture, or woodland.

This soil is fairly well suited to corn and soybeans, but damage from floodwaters can be expected. Wetness and the flooding are major management concerns. Crusting is also a concern. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Dikes or levees help to control flooding, but they are extremely expensive if properly constructed. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control scouring by floodwater, help to prevent crusting, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to spring moldboard, spring chisel, and ridge-till tillage systems and to no-till if the new crop is planted in residue-cleared rows.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture, but prolonged flooding can damage these crops from late fall through spring. The wetness and the flooding are concerns. Subsurface drains can be used to remove excess water if adequate outlets are available. Some areas can be protected from flooding by dikes and levees. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is severe. Frequent flooding can delay planting and harvesting. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of the flooding, this soil is generally unsuited to use as a site for dwellings. In addition, the wetness is a severe limitation on sites for dwellings with basements. Because of low strength, the flooding, and the potential for frost action, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by flooding and by frost action.

The land capability classification is IIIw. The woodland ordination symbol is 5A.

TmA—Toronto-Millbrook complex, 0 to 2 percent slopes. This map unit consists of nearly level, somewhat poorly drained soils on till plains. The Toronto soil is deep over compact glacial till, and the Millbrook soil is very deep. The Toronto soil is generally in slightly higher areas than the Millbrook soil. Individual areas of this unit are irregular in shape and generally range from 2 to 100 acres in size. Some broad areas are several hundred acres in size. The areas are about 45 percent Toronto soil and 35 percent Millbrook soil. The two soils occur as areas so intricately mixed that it was not practical to map them separately.

Typically, the surface layer of the Toronto soil is very dark grayish brown silt loam about 9 inches thick. The subsoil is about 43 inches thick. It is dark brown and

dark yellowish brown, mottled, firm silty clay loam and silty clay in the upper part and dark yellowish brown and yellowish brown, mottled, firm clay loam and loam in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown, mottled loam. In places the surface layer is lighter colored. In some areas compact glacial till is at a depth of less than 40 inches. In a few small areas the soil has more than 40 inches of silty material. In some places stratified material is above the underlying glacial till. In some areas the underlying glacial till is either sandy loam or silt loam. In other areas the dark surface layer is 10 or more inches thick.

Typically, the surface layer of the Millbrook soil is very dark grayish brown silt loam about 9 inches thick. The subsoil is about 40 inches thick. The upper part is light olive brown, mottled, firm silty clay loam; the next part is yellowish brown, mottled, firm silty clay loam and loam; and the lower part is yellowish brown, mottled, firm loam that has pockets of loamy sand and sandy loam. The underlying material to a depth of 60 inches or more is yellowish brown, mottled silt loam that has strata of loamy sand. In places the surface layer is lighter colored. In some areas compact glacial till is at a depth of less than 60 inches. In a few small areas the soil has more than 40 inches of silty material. In some places the dark surface layer is 10 or more inches thick.

Included with these soils in mapping are the poorly drained Drummer soils in depressions and drainageways. Also included are the well drained Octagon soils on rises and in the more sloping areas along drainageways and the moderately well drained Throckmorton soils on slight rises. Included soils make up about 15 percent of the unit.

The available water capacity is high in the Toronto and Millbrook soils. Permeability is moderate in the upper part of the solum in the Toronto soil, moderately slow in the lower part of the solum, and slow in the underlying material. It is moderate in the Millbrook soil. Surface runoff is slow on both soils. The content of organic matter in the surface layer is moderate. The water table is at a depth of 1 to 3 feet in winter and spring.

Most areas are used for cultivated crops. Some areas are used for hay or pasture. A few small areas are used as woodland.

These soils are well suited to corn, soybeans, and small grain. Wetness is a major limitation. Crusting is also a concern. Subsurface drains can be used to remove excess water if adequate outlets are available. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. These soils are well suited to moldboard, fall chisel, no-till, and ridge-till tillage systems.

These soils are well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. The wetness is a limitation. Subsurface drains can be used to remove excess water if adequate outlets are available. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

The Millbrook soil is well suited to trees. Plant competition is moderate. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of the wetness, these soils are severely limited as sites for dwellings. Installing subsurface drains helps to lower the water table. Constructing buildings on raised, well compacted fill material also helps to overcome the wetness. Because of low strength and the potential for frost action, the soils are severely limited as sites for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is IIw. The woodland ordination symbol is 4A for the Millbrook soil. No woodland ordination symbol is assigned for the Toronto soil.

TnB2—Toronto-Octagon complex, 2 to 6 percent slopes, eroded. This map unit consists of gently sloping soils along drainageways on till plains and recessional moraines. The somewhat poorly drained Toronto soil is on toe slopes, in drainageways, and on the less sloping part of side slopes. It is deep over compact glacial till. The well drained Octagon soil is on knolls, shoulder slopes, and the more sloping part of side slopes. It is moderately deep over compact glacial till. Individual areas of this unit are irregular in shape and range from 2 to 80 acres in size. They are about 45 percent Toronto soil and 40 percent Octagon soil. The two soils occur as areas so intricately mixed or so small that it was not practical to map them separately.

Typically, the surface layer of the Toronto soil is very dark grayish brown silt loam about 9 inches thick. It contains dark yellowish brown material from the subsoil.

The subsoil is about 33 inches thick. The upper part is dark yellowish brown, mottled, firm silty clay loam, and the lower part is olive brown and light olive brown, mottled, firm clay loam and loam. The underlying material to a depth of 60 inches or more is light olive brown, mottled loam. In places the surface layer is lighter colored. In a few areas the soil has less than 22 inches of silty material. In some places the depth to the underlying compact glacial till is less than 40 inches. In other places a thin layer of stratified material is above the glacial till. In some areas the glacial till is either silt loam or fine sandy loam.

Typically, the surface layer of the Octagon soil is very dark grayish brown silt loam about 8 inches thick. It contains dark yellowish brown material from the subsoil. The subsoil is about 18 inches thick. It is dark yellowish brown, firm clay loam in the upper part and yellowish brown, firm loam in the lower part. The underlying material to a depth of 60 inches or more is light olive brown loam. In places the surface layer is lighter colored. In a few areas the depth to the underlying compact glacial till is less than 24 inches. In some places stratified material is above the glacial till. In other places the glacial till is either silt loam or fine sandy loam.

Included with these soils in mapping are the poorly drained Drummer soils in depressions and drainageways and the somewhat poorly drained Millbrook soils in landscape positions similar to those of the Toronto soil. Millbrook soils are underlain by stratified material. Also included are severely eroded areas where the surface soil is silty clay loam or clay loam and areas of the well drained Lauramie and moderately well drained Throckmorton soils. Lauramie and Throckmorton soils are on the upper part of side slopes. Lauramie soils have a solum that is more than 40 inches thick. Included soils make up about 15 percent of the unit.

The available water capacity is high in the Toronto soil and moderate in the Octagon soil. Permeability is moderate in the upper part of the solum in the Toronto soil, moderately slow in the lower part of the solum, and slow in the underlying material. It is moderate in the subsoil of the Octagon soil and slow in the underlying material. Surface runoff is medium on both soils. The content of organic matter in the surface layer is moderate. The water table is at a depth of 1 to 3 feet in winter and spring in the Toronto soil.

Most areas are used for cultivated crops. Some areas are used for hay or pasture. A few small areas are used as woodland.

These soils are well suited to corn, soybeans, and small grain. Erosion is a hazard. Wetness is a limitation in areas of the Toronto soil. Crusting is also a concern. Subsurface drains are needed in some areas of the Toronto soil on toe slopes and in drainageways. Erosion and surface runoff can be controlled by diversions, terraces, water- and sediment-control basins, cover crops, green manure crops, grade-stabilization structures, and crop rotations that include grasses and legumes. Grassed waterways help to control erosion in the drainageways. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control erosion, help to prevent crusting, and maintain or improve tilth, infiltration, aeration, and the content of organic matter. These soils are well suited to no-till and ridge-till tillage systems. They are also well suited to spring moldboard and chisel tillage systems if the new crop is planted into corn residue.

These soils are well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. Erosion is a hazard. Subsurface drains are needed in some areas of the Toronto soil on toe slopes and in drainageways. Growing grasses and legumes helps to control surface runoff and erosion. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

The wetness is a severe limitation if the Toronto soil is used as a site for dwellings. Installing subsurface drains helps to lower the water table. Constructing buildings on raised, well compacted fill material also helps to overcome the wetness. The Octagon soil is suitable for use as a site for dwellings with or without basements. Because of low strength, the Toronto and Octagon soils are severely limited as sites for local roads and streets. The potential for frost action is an additional concern in areas of the Toronto soil. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is IIe. No woodland ordination symbol is assigned.

TtA—Troxel silty clay loam, 0 to 2 percent slopes. This nearly level, very deep, well drained soil is in depressions on outwash plains and terraces. It is frequently ponded by surface runoff from adjacent areas. Individual areas are irregular in shape and range from 2 to 50 acres in size.

Typically, the surface layer is black silty clay loam

about 12 inches thick. The subsurface layer is about 30 inches thick. It is black silty clay loam in the upper part and black clay loam in the lower part. The subsoil extends to a depth of 80 inches or more. It is brown, firm loam in the upper part; dark yellowish brown, friable fine sandy loam and sandy loam in the next part; and brown, loose gravelly coarse sand in the lower part. In some places the dark surface soil is less than 24 inches thick. In a few areas the upper part of the subsoil has more sand and less clay. In a few places the dark surface soil is more than 45 inches thick.

Included with this soil in mapping are small areas of the well drained Carmi and Elston soils and the well drained Billett soils that have a gravelly substratum. These soils are at the higher elevations. They have less clay and more sand in the subsoil than the Troxel soil and have a dark surface layer less than 24 inches thick. They make up about 15 percent of the unit.

The available water capacity is very high in the Troxel soil. Permeability is moderate. Surface runoff is very slow or ponded. The content of organic matter in the surface layer is high.

Most areas of this soil are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn and soybeans. It is only fairly well suited to fall-planted small grain crops because of the ponding, which occurs during periods when the ground is frozen. Crusting is a concern. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to moldboard, chisel, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture, but prolonged ponding can damage these crops when the ground is frozen. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

Because of the ponding, this soil is generally unsuited to use as a site for dwellings. Because of low strength, the ponding, and the potential for frost action, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent damage caused by ponding and by frost action.

The land capability classification is I. No woodland ordination symbol is assigned.

Ua—Udorthents, loamy. These nearly level to very steep, very poorly drained to well drained soils are in disturbed areas on uplands, outwash plains, terraces, and flood plains. They are around highways and highway interchanges, shopping centers, sanitary landfills, and factories. In some places, deep cuts have been made in the original land surface and the soil material has been used as fill in the lower lying areas. In other places the soil material has been removed and used as fill for highway grades or for other uses. Individual areas range from 3 to 300 acres in size.

Typically, these soils are a mixture of surface soil, subsoil, and underlying material. The texture is silt loam, silty clay loam, clay loam, loam, and sandy loam. Waste material may be mixed in.

Included in mapping are small areas of undisturbed soils. Also included are areas where sandy or gravelly material has been used as fill material. Highways, streets, buildings, and parking lots cover much of the surface in some areas.

The available water capacity is very low to moderate in the Udorthents. Permeability is slow to moderate. Surface runoff ranges from very slow to rapid. The content of organic matter in the surface layer is very low. The depth to the water table ranges from at or near the surface to below a depth of 6 feet. Reaction ranges from strongly acid to moderately alkaline.

Most areas support a permanent cover of grasses, low-growing shrubs, or trees. Many areas are surrounded by heavily traveled highways. Erosion is the major management concern. Special management is needed. An intensified fertility program with special emphasis on the incorporation of organic residue or manure is needed if the soils are used for crops. Diversions, box inlet structures, grade-stabilization structures, and grassed waterways help to control erosion in gently sloping to very steep areas. Exposed areas should be revegetated as soon as possible after construction.

Onsite investigation is needed if these soils are to be used as building sites or for local roads and streets. Because the soil material is variable, engineering test data should be collected. The soil properties that affect the design of a structure vary within short distances.

No land capability classification or woodland ordination symbol is assigned.

UbB—Urban land-Billett, gravelly substratum, complex, 2 to 8 percent slopes. This map unit consists of areas of Urban land and the gently sloping, well drained Billett soil on outwash plains and terraces. The Billett soil is deep over gravelly coarse sand. Individual

areas of this unit range from 60 to 170 acres in size. They are about 50 percent Urban land and 40 percent Billett soil. The Urban land and the Billett soil occur as areas so intricately mixed that it was not practical to map them separately.

The Urban land is covered by streets, parking lots, buildings, and other structures that so obscure or alter the soils that identification of the original soil is not possible.

The Billett soil has a gravelly substratum. Typically, the surface layer is very dark gray loam about 8 inches thick. The subsoil is about 35 inches thick. It is dark yellowish brown and dark brown, friable loam and sandy loam in the upper part and dark brown, very friable loamy sand in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown gravelly coarse sand. In places the dark surface layer is more than 10 inches thick. In a few areas the subsoil has more gravel. In some places the upper part of the subsoil has less sand.

Included in mapping are areas of the well drained Troxel soils in depressions. These soils have more clay and less sand in the subsoil than the Billett soil and have a dark surface layer more than 24 inches thick. Also included are more sloping areas along drainageways and slope breaks. Included areas make up about 10 percent of the unit.

The available water capacity is moderate in the Billett soil. Permeability is moderately rapid in the upper part of the solum, rapid in the lower part of the solum, and very rapid in the underlying material. Surface runoff is medium. The content of organic matter in the surface layer is moderately low.

Most areas of this unit are used for dwellings. A few areas are idle land or are used for recreational facilities.

This unit is not used for crops, forage, or woodland. If trees and shrubs are planted, competing plants should be controlled until seedlings are established.

The Billett soil is suitable as a site for dwellings. Because of the potential for frost action, the soil is moderately limited as a site for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

No land capability classification or woodland ordination symbol is assigned.

UcA—Urban land-Carmi complex, 0 to 2 percent slopes. This map unit consists of areas of Urban land and the nearly level, well drained Carmi soil on outwash plains and terraces. The Carmi soil is deep over gravelly coarse sand. Individual areas of this unit range from 30 to more than 1,000 acres in size. They are about 55 percent Urban land and 35 percent Carmi soil. The Urban land and the Carmi soil occur as areas so intricately mixed that it was not practical to map them separately.

The Urban land is covered by streets, parking lots, buildings, and other structures that so obscure or alter the soils that identification is not possible.

Typically, the surface layer of the Carmi soil is very dark gray loam about 12 inches thick. The subsoil is about 35 inches thick. It is dark brown, firm loam in the upper part; dark brown, firm gravelly loam and gravelly sandy loam in the next part; and dark brown, very friable gravelly loamy sand in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown gravelly coarse sand. In places the dark surface layer is less than 10 inches thick. In some areas the upper part of the subsoil has less sand. In a few places the subsoil has less gravel.

Included in mapping are the well drained Troxel soils in depressions. These soils have more clay and less sand in the subsoil than the Carmi soil and have a dark surface layer more than 24 inches thick. They make up about 10 percent of the unit.

The available water capacity is moderate in the Carmi soil. Permeability is moderately rapid in the solum and very rapid in the underlying material. Surface runoff is slow. The content of organic matter in the surface layer is moderate.

Most areas of this unit are used for dwellings. A few areas are idle land or are used for recreational facilities.

This unit is not used for crops, forage, or woodland. If trees and shrubs are planted, competing plants should be controlled until seedlings are established.

The Carmi soil is suitable for use as a site for dwellings. Because of the potential for frost action, the soil is moderately limited as a site for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

No land capability classification or woodland ordination symbol is assigned.

UmB—Urban land-Miami complex, 2 to 8 percent slopes. This map unit consists of areas of Urban land and the gently sloping and moderately sloping, well drained Miami soil on till plains and recessional moraines. The Miami soil is moderately deep over compact glacial till. Individual areas of this unit range from 5 to 400 acres in size. They are about 45 percent Urban land and 40 percent Miami soil. The Urban land and the Miami soil occur as areas so intricately mixed that it was not practical to map them separately.

The Urban land is covered by streets, parking lots,

buildings, and other structures that so obscure or alter the soils that identification of the original soil is not possible.

Typically, the surface layer of the Miami soil is very dark grayish brown silt loam about 4 inches thick. The subsurface layer is brown, friable silt loam about 6 inches thick. The subsoil is about 26 inches thick. It is dark yellowish brown, friable silty clay loam in the upper part and dark yellowish brown, firm clay loam and loam in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown loam. In places compact glacial till is at a depth of less than 24 inches. In some areas stratified material is above the glacial till.

Included in mapping are the somewhat poorly drained Crosby, Fincastle, and Starks soils on toe slopes and in drainageways. Also included are the well drained Richardville soils in landscape positions similar to those of the Miami soil. Richardville soils have a solum that is more than 40 inches thick. Included soils make up about 15 percent of the unit.

The available water capacity is moderate in the Miami soil. Permeability is moderate in the upper part of the subsoil, moderately slow in the lower part of the subsoil, and slow in the underlying material. Surface runoff is medium. The content of organic matter in the surface layer is moderately low.

Most areas of this unit are used for dwellings. A few areas are idle land or are used for recreational facilities.

This unit is not used for crops, forage, or woodland. If trees and shrubs are planted, competing plants should be controlled until seedlings are established.

The shrink-swell potential is a moderate limitation if the Miami soil is used as a site for dwellings. Foundations, footings, and basement walls should be strengthened. Backfilling with coarser material helps to prevent the structural damage caused by shrinking and swelling of the soil. Because of low strength, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic.

No land capability classification or woodland ordination symbol is assigned.

UmC—Urban land-Miami complex, 8 to 15 percent slopes. This map unit consists of areas of Urban land and the moderately sloping and strongly sloping, well drained Miami soil on till plains and recessional moraines. The Miami soil is moderately deep over compact glacial till. Individual areas of this unit range from 5 to 250 acres in size. They are about 45 percent Urban land and 40 percent Miami soil. The Urban land and the Miami soil occur as areas so intricately mixed that it was not practical to map them separately.

The Urban land is covered by streets, parking lots, buildings, and other structures that so obscure or alter the soils that identification of the original soil is not possible.

Typically, the surface layer of the Miami soil is very dark grayish brown silt loam about 3 inches thick. The subsurface layer is yellowish brown, friable silt loam about 5 inches thick. The subsoil is about 28 inches thick. It is yellowish brown and dark yellowish brown, firm silty clay loam in the upper part and light olive brown, firm clay loam in the lower part. The underlying material to a depth of 60 inches or more is light olive brown loam. In places compact glacial till is at a depth of less than 24 inches. In some areas stratified material is above the glacial till.

Included in mapping are the somewhat poorly drained Crosby, Fincastle, and Starks soils on toe slopes and in drainageways. Also included are the well drained Richardville soils in landscape positions similar to those of the Miami soil. Richardville soils have a solum that is more than 40 inches thick. Included soils make up about 11 percent of the unit.

The available water capacity is moderate in the Miami soil. Permeability is moderate in the upper part of the subsoil, moderately slow in the lower part of the subsoil, and slow in the underlying material. Surface runoff is medium or rapid. The content of organic matter in the surface layer is moderately low.

Most areas of this unit are used for dwellings. A few areas are idle land or are used for recreational facilities.

This unit is not used for crops, forage, or woodland. If trees and shrubs are planted, competing plants should be controlled until seedlings are established.

The shrink-swell potential and the slope are moderate limitations if the Miami soil is used as a site for dwellings. Foundations, footings, and basement walls should be strengthened. Backfilling with coarser material helps to prevent the structural damage caused by shrinking and swelling of the soil. The buildings should be designed so that they conform to the natural contour of the land. Because of low strength, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic.

No land capability classification or woodland ordination symbol is assigned.

UsA—Urban land-Starks-Fincastle complex, 0 to 2 percent slopes. This map unit consists of areas of Urban land and the nearly level, somewhat poorly drained Starks and Fincastle soils on till plains. The Starks soil is very deep, and the Fincastle soil is deep over compact glacial till. Individual areas of this unit are

broad and are more than 1,000 acres in size. They are about 45 percent Urban land, 25 percent Starks soil, and 15 percent Fincastle soil. The Urban land and the Starks and Fincastle soils occur as areas so intricately mixed that it was not practical to map them separately.

The Urban land is covered by streets, parking lots, buildings, and other structures that so obscure or alter the soils that identification of the original soil is not possible.

Typically, the surface layer of the Starks soil is very dark grayish brown silt loam about 5 inches thick. The subsurface layer is grayish brown, friable silt loam about 9 inches thick. The subsoil is about 48 inches thick. It is dark yellowish brown and yellowish brown, mottled, firm silty clay loam in the upper part; yellowish brown, mottled, firm clay loam in the next part; and dark gray, mottled, firm clay loam and sandy clay loam in the lower part. The underlying material to a depth of 70 inches or more is yellowish brown, mottled loamy sand. In places the soil has more than 40 inches of silty material. In a few areas the surface layer is darker. In some places glacial till is within a depth of 60 inches.

Typically, the surface layer of the Fincastle soil is very dark gray silt loam about 4 inches thick. The subsurface layer is light brownish gray silt loam about 4 inches thick. The subsoil is about 38 inches thick. It is light brownish gray, mottled, friable silt loam in the upper part; yellowish brown, mottled, firm silty clay loam in the next part; and yellowish brown, mottled, firm clay loam in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown, mottled loam. In places the soil has more than 40 inches of silty material. In some areas stratified material is above the glacial till. In some places the subsoil has more clay. In a few areas the surface layer is darker.

Included in mapping are the somewhat poorly drained Crosby soils, the moderately well drained Rockfield soils, the very poorly drained Treaty and Mahalasville soils, and the well drained Miami soils. Crosby soils are at the slightly higher elevations and have a solum that is less than 40 inches thick. Treaty and Mahalasville soils are in shallow depressions and drainageways. Miami soils are in the higher, more convex areas. Also included, in depressions, are many areas of very poorly drained soils that have been covered by fill material and leveled. Included soils make up about 15 percent of the unit.

The available water capacity is high in the Starks and Fincastle soils. Permeability is moderate in the Starks soil. It is moderate in the upper part of the solum in the Fincastle soil, moderately slow in the lower part of the solum, and slow in the underlying material. Surface runoff is slow on both soils. The content of organic matter in the surface layer is moderately low. The water table is at a depth of 1 to 3 feet during the winter and early spring.

Most areas of this unit are used for dwellings. A few areas are idle land or are used for recreational facilities.

This unit is not used for crops, forage, or woodland. If trees and shrubs are planted, competing plants should be controlled until seedlings are established.

The wetness is a severe limitation if the Starks and Fincastle soils are used as sites for dwellings. Installing subsurface drains helps to lower the water table. Constructing buildings on raised, well compacted fill material also helps to overcome the wetness. Because of low strength and the potential for frost action, the soils are severely limited as sites for local roads and streets. Strengthening the base material for roads and streets or replacing it with a more suitable base material improves the ability of the soils to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by frost action.

No land capability classification or woodland ordination symbol is assigned.

Wb—Wallkill silt loam, coprogenous earth substratum. This nearly level, very deep, very poorly drained soil is in depressions on outwash plains, recessional moraines, and till plains. It is frequently ponded by surface runoff from adjacent areas. Individual areas are irregular in shape and range from 2 to 30 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 10 inches thick. The subsoil is dark gray, firm silt loam about 17 inches thick. Below this, to a depth of 54 inches, is muck. The upper part is black and firm, and the lower part is dark reddish brown and friable. The underlying material to a depth of 60 inches or more is very dark grayish brown coprogenous earth. In some areas overwash mineral material is less than 16 inches or more than 40 inches thick. In a few areas the organic material extends to a depth of more than 60 inches. In a few places mineral material is below the coprogenous earth within a depth of 60 inches.

Included with this soil in mapping are areas of the very poorly drained Mahalasville, Treaty, and Pella soils and the poorly drained Drummer soils in the slightly higher positions at the edges of deep depressions. These soils formed in mineral material. Also included are some areas that have not been drained. Included areas make up about 15 percent of the unit.

The available water capacity is very high in the Wallkill soil. Permeability is moderately slow in the mineral material, moderately slow to moderately rapid in the organic material, and slow in the underlying

coprogenous earth. Surface runoff is very slow or ponded. The content of organic matter in the surface layer is moderately low or moderate. The water table is at or above the surface during the winter and spring.

Most areas of this soil are used for cultivated crops. A few areas are used for hay, pasture, or woodland. Some areas are idle land.

This soil is fairly well suited to corn and soybeans. Wetness and the ponding are major management concerns. Crusting is also a concern. Small grain planted in the fall is subject to severe damage during periods of prolonged ponding. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to fall moldboard, fall chisel, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. Wetness is a limitation, and ponding is a hazard. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is poorly suited to trees. The main management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. The equipment limitation is caused by wetness. The wetness can be overcome by performing woodland management activities during periods when the soil is relatively dry or is frozen. Site preparation, special planting stock, and overstocking help to overcome seedling mortality. Species that tolerate wetness should be planted. Using harvest methods that do not leave the remaining trees isolated or widely spaced helps to overcome the windthrow hazard. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of the ponding, this soil is generally unsuited to use as a site for dwellings. In addition, low strength is a severe limitation on sites for dwellings without basements. Because of the ponding and the potential for frost action, the soil is severely limited as a site for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by ponding and by frost action.

The land capability classification is IIIw. The woodland ordination symbol is 2W.

We—Washtenaw silt loam. This nearly level, very deep, very poorly drained soil is in depressions on recessional moraines and till plains. It is frequently ponded by surface runoff from adjacent areas. Individual areas are irregular in shape and range from 2 to 15 acres in size.

Typically, the surface layer is brown silt loam about 10 inches thick. The substratum, to a depth of about 23 inches, is dark grayish brown silt loam. Below this is a buried soil. The surface layer of the buried soil is very dark gray, firm silty clay loam about 8 inches thick. The subsoil is about 34 inches thick. It is dark gray, mottled, firm silty clay loam in the upper part and gray, mottled, firm clay loam and loam in the lower part. The underlying material to a depth of 70 inches or more is yellowish brown, mottled loam. In some areas the light colored overwash material is less than 20 inches or more than 40 inches thick. In places the overwash material is darker.

Included with this soil in mapping are small areas of the well drained Miami soils, the somewhat poorly drained Crosby soils, and the very poorly drained Mahalasville and Treaty soils in the slightly higher positions at the edges of deep depressions. Mahalasville and Treaty soils do not have a buried soil. Included soils make up about 10 percent of the unit.

The available water capacity is high in the Washtenaw soil. Permeability is moderate in the overwash material and slow in the buried soil. Surface runoff is very slow or ponded. The content of organic matter in the surface layer is moderate. The water table is at or above the surface, mainly during the winter and spring.

Most areas of this soil are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn and soybeans. Wetness and the ponding are major management concerns. Crusting is also a concern. Small grain planted in the fall is subject to severe damage during periods of prolonged ponding. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Small enclosed depressions can be drained with an open inlet pipe in conjunction with subsurface drainage. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops

help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to fall moldboard, fall chisel, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. Wetness is a limitation, and ponding is a hazard. Shallow surface drains and subsurface drains can be used to remove excess water if adequate outlets are available. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. The main management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. The equipment limitation is caused by wetness. The wetness can be overcome by performing woodland management activities during periods when the soil is relatively dry or is frozen. Site preparation, special planting stock, and overstocking help to overcome seedling mortality. Species that tolerate wetness should be planted. Using harvest methods that do not leave the remaining trees isolated or widely spaced helps to overcome the windthrow hazard. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

Because of the ponding, this soil is generally unsuited to use as a site for dwellings. The ponding and the potential for frost action are severe limitations on sites for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by ponding and by frost action.

The land capability classification is IIw. The woodland ordination symbol is 5W.

WgA—Waupecan silt loam, 0 to 2 percent slopes. This nearly level, well drained soil is on outwash plains. It is deep or very deep over gravelly sand. Individual areas are irregular in shape and range from 3 to 350 acres in size.

Typically, the surface layer is very dark gray silt loam about 11 inches thick. The subsoil is about 50 inches thick. It is dark brown, friable silt loam in the upper part; dark yellowish brown, firm silty clay loam in the next part; and dark brown, firm sandy loam and very friable loamy sand in the lower part. The underlying material to a depth of 70 inches or more is yellowish brown gravelly sand. In places the dark surface layer is less than 10 inches thick. In a few areas the silty material is less than 28 inches thick. In some places the dark surface soil is more than 20 inches thick.

Included with this soil in mapping are small areas of the moderately well drained, moderately wet Waupecan soils; the somewhat poorly drained Lafayette soils; and the very poorly drained Mahalasville soils that have a gravelly substratum. The moderately wet Waupecan soils and the Lafayette soils are in the slightly lower positions on the landscape. The Mahalasville soils are in depressions. Also included, on rises and in the more sloping areas, are the well drained Longlois soils. Longlois soils have more sand in the upper part of the subsoil than the Waupecan soil. Included soils make up about 15 percent of the unit.

The available water capacity is high in the Waupecan soil. Permeability is moderate in the upper part of the solum, moderately rapid in the lower part of the solum, and very rapid in the underlying material. Surface runoff is slow. The content of organic matter in the surface layer is moderate.

Most areas of this soil are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Crusting is a concern. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to moldboard, chisel, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

The shrink-swell potential is a moderate limitation if this soil is used as a site for dwellings. Foundations, footings, and basement walls should be strengthened. Backfilling with coarser material helps to prevent the structural damage caused by shrinking and swelling of the soil. Because of low strength and the potential for frost action, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is I. No woodland ordination symbol is assigned.

WhA—Waupecan silt loam, moderately wet, 0 to 2 percent slopes. This nearly level, moderately well drained soil is on outwash plains. It is deep or very deep over gravelly coarse sand. Individual areas are irregular in shape and range from 3 to 250 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 10 inches thick. The subsurface layer also is very dark grayish brown silt loam. It is about 5 inches thick. The subsoil is about 43 inches thick. The upper part is dark yellowish brown, firm silty clay loam; the next part is yellowish brown, mottled, firm silty clay loam and clay loam; and the lower part is grayish brown and dark grayish brown, mottled, firm sandy loam and gravelly sandy loam. The underlying material to a depth of 60 inches or more is light gray gravelly coarse sand. In places the dark surface layer is less than 10 inches thick. In a few areas the silty material is less than 28 inches thick. In some places glacial till is within a depth of 60 inches.

Included with this soil in mapping are small areas of the somewhat poorly drained Lafayette soils and the very poorly drained Mahalasville soils that have a gravelly substratum. These soils are in slight depressions. Also included are the well drained Waupecan soils in the slightly higher areas. Included soils make up about 15 percent of the unit.

The available water capacity is high in the Waupecan soil. Permeability is moderate in the upper part of the solum, moderately rapid in the lower part of the solum, and very rapid in the underlying material. Surface runoff is slow. The content of organic matter in the surface layer is moderate. The water table is at a depth of 3 to 6 feet in winter and spring.

Most areas of this soil are used for cultivated crops. A few areas are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. Crusting is a concern. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to moldboard, chisel, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as orchardgrass and alfalfa, for hay and pasture. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

The shrink-swell potential is a moderate limitation if this soil is used as a site for dwellings. In addition, the wetness is a moderate limitation on sites for buildings with basements. Foundations, footings, and basement walls should be strengthened. Backfilling with coarser material helps to prevent the structural damage caused by shrinking and swelling of the soil. Installing subsurface drains helps to lower the water table. Because of low strength and the potential for frost action, the soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is I. No woodland ordination symbol is assigned.

WmA—Waynetown silt loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on stream terraces and outwash plains. It is deep or very deep over gravelly coarse sand. Individual areas are irregular in shape and range from 2 to 40 acres in size.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsoil is about 43 inches thick. It is dark yellowish brown, mottled, firm silty clay loam in the upper part; grayish brown, mottled, firm clay loam in the next part; and dark gray and dark grayish brown, mottled, firm gravelly sandy clay loam and friable gravelly sandy loam in the lower part. The underlying material to a depth of 60 inches or more is grayish brown, mottled gravelly coarse sand. In a few small areas the silty material is less than 20 inches thick. In some places glacial till is within a depth of 60 inches. In other places the surface layer is darker.

Included with this soil in mapping are small areas of the well drained Kalamazoo and moderately well drained Thackery soils on slight rises and in the more sloping areas. Also included, in depressions, are small areas of the very poorly drained Mahalasville soils that have a gravelly substratum. Included soils make up about 15 percent of the unit.

The available water capacity is high in the Waynetown soil. Permeability is moderate in the solum and very rapid in the underlying material. Surface runoff is slow. The content of organic matter in the surface layer is moderately low. The water table is at a depth of 1 to 3 feet in winter and spring.

Most areas of this soil are used for cultivated crops. Some areas are used for hay or pasture. A few small areas are used as woodland.

This soil is well suited to corn, soybeans, and small grain. Wetness is a major limitation. Crusting is also a concern. Subsurface drains can be used to remove excess water if adequate outlets are available. Using a

system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to moldboard, fall chisel, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. Wetness is a limitation. Subsurface drains can be used to remove excess water if adequate outlets are available. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is moderate. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

The wetness is a severe limitation if this soil is used as a site for dwellings. Installing subsurface drains helps to lower the water table. Constructing buildings on raised, well compacted fill material also helps to overcome the wetness. Because of low strength and the potential for frost action, this soil is severely limited as a site for local roads and streets. Strengthening the base material for roads or replacing it with a more suitable material improves the ability of the soil to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is IIw. The woodland ordination symbol is 5A.

WtA—Wea silt loam, occasionally flooded. This nearly level, very deep, well drained soil is on flood plains. It is subject to occasional flooding for brief or long periods from late fall through spring. Individual areas are irregular in shape and range from 5 to 150 acres in size.

Typically, the surface layer is very dark gray silt loam about 10 inches thick. The subsurface layer is very dark gray, friable silt loam about 15 inches thick. The subsoil is about 39 inches thick. It is dark brown, firm clay loam and gravelly sandy clay loam in the upper part and dark brown and dark yellowish brown, friable gravelly sandy loam in the lower part. The underlying material to a depth of 70 inches or more is yellowish brown gravelly sand. In places the subsoil has less clay. In a few small areas, the soil is calcareous throughout. In some places the surface layer is sandy loam.

Included with this soil in mapping are the well drained Allison and Battleground soils at the slightly lower elevations. These soils have less sand in the subsoil than the Wea soil. Also included are the somewhat excessively drained Ouiatenon soils that have a sandy substratum. Ouiatenon soils are in the slightly lower lying areas adjacent to stream channels. Included soils make up about 15 percent of the unit.

The available water capacity is high in the Wea soil. Permeability is moderate in the solum and very rapid in the underlying material. Surface runoff is slow. The content of organic matter in the surface layer is moderate.

Most areas of this soil are used for cultivated crops. Some areas are used for woodland, hay, or pasture.

This soil is well suited to corn and soybeans, but damage from floodwaters can be expected. Flooding is the major hazard. Crusting is also a concern. Levees or dikes help to control flooding, but they are extremely expensive if properly constructed. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to control scouring by floodwater, help to prevent crusting, and help to maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to spring moldboard, spring chisel, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture, but prolonged flooding from late fall through spring can damage these crops. Levees and dikes help to control flooding. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

Because of the flooding, this soil is generally unsuited to use as a site for dwellings and is severely limited as a site for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by flooding.

The land capability classification is IIw. No woodland ordination symbol is assigned.

WuA—Whitaker loam, till substratum, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on till plains. It is deep over compact glacial till. Individual areas are irregular in shape and range from 2 to 40 acres in size.

Typically, the surface layer is brown loam about 10 inches thick. The subsoil is about 48 inches thick. It is

brown and grayish brown, mottled, firm loam and clay loam in the upper part; gray, mottled, firm sandy clay loam in the next part; and grayish brown, mottled, very friable loamy sand in the lower part. The underlying material to a depth of 70 inches or more is yellowish brown, mottled loam. In places the surface layer is darker. In a few small areas the surface layer is sandy loam. In a few places the underlying compact glacial till is at a depth of less than 40 inches.

Included with this soil in mapping are moderately well drained soils on slight rises and in the more sloping areas along drainageways. Also included are small areas of the very poorly drained Treaty and Mahalasville soils in depressions and drainageways. Included soils make up about 15 percent of the unit.

The available water capacity is high in the Whitaker soil. Permeability is moderate in the solum and slow in the underlying material. Surface runoff is slow. The content of organic matter in the surface layer is moderately low. The water table is at a depth of 1 to 3 feet in winter and spring.

Most areas of this soil are used for cultivated crops. Some areas are used for hay or pasture. A few small areas are used as woodland.

This soil is well suited to corn, soybeans, and small grain. Wetness is a major limitation. Crusting is also a concern. Subsurface drains can be used to remove excess water if adequate outlets are available. Using a system of conservation tillage that leaves a protective cover of crop residue on the surface and planting cover crops help to prevent crusting and maintain or improve tilth, infiltration, aeration, and the content of organic matter. This soil is well suited to moldboard, fall chisel, no-till, and ridge-till tillage systems.

This soil is well suited to grasses and legumes, such as reed canarygrass and ladino clover, for hay and pasture. Wetness is a limitation. Subsurface drains can be used to remove excess water if adequate outlets are available. Deep-rooted legumes, such as alfalfa, are not as well suited as shallow-rooted crops. Overgrazing or grazing when the soil is too wet can cause surface compaction and poor tilth and can reduce plant densities. Proper stocking rates, rotation grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is moderate. Competing vegetation can be controlled by spraying, cutting, or girdling. Excluding livestock, harvesting mature trees, and saving desired seed trees are additional management practices.

The wetness is a severe limitation if this soil is used as a site for dwellings. Installing subsurface drains helps to lower the water table. Constructing buildings on raised, well compacted fill material also helps to overcome the wetness. Because of the potential for frost action, the soil is severely limited as a site for local roads and streets. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent frost damage.

The land capability classification is IIw. The woodland ordination symbol is 4A.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to food, feed, forage, fiber, and oilseed crops. It may be cultivated land, pasture, woodland, or other land, but it is not urban or built-up land or water areas. It either is used for food or fiber crops or is available for those crops. The soil qualities, growing season, and moisture supply are those needed for a well managed soil to produce a sustained high yield of crops in an economic manner. Prime farmland produces the highest yields with minimal expenditure of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The level of acidity or alkalinity is acceptable. Prime farmland has few or no rocks and is permeable to water and air. It is not excessively erodible or saturated with water for long periods and is not frequently flooded during the growing season. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 264,000 acres in the survey area, or nearly 82 percent of the total acreage, meets the soil requirements for prime farmland. Scattered areas of this land are throughout the county. Nearly all of the prime farmland is used for corn or soybeans.

A recent trend in land use in some parts of the county has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Some soils that have a seasonal high water table and all soils that are frequently flooded during the growing season qualify as prime farmland only in areas where these limitations have been overcome by drainage measures or flood control. The need for these measures is indicated after the map unit name in table 5. Onsite evaluation is needed to determine whether or not these limitations have been overcome by corrective measures.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this soil survey is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this survey are intended to help the land users identify and reduce the effects of soil limitations that affect various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Crops and Pasture

William Martin, district conservationist, Natural Resources Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the estimated yields of the main crops and hay and pasture plants are listed for each soil; and the system of land capability classification used by the Natural Resources Conservation Service is explained.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

In 1982, a total of 229,079 acres in Tippecanoe County was used as cropland (U.S. Department of Commerce, 1983). Of this acreage, 199,596 acres was used for row crops, mainly corn and soybeans; 10,375 acres was used for wheat or oats; and 6,560 acres was used for hay. About 3,632 acres was used as permanent pasture, and 16,503 acres was woodland.

The acreage used for crops and pasture has been decreasing as more land is developed for urban uses. An estimated 24,000 acres was urban land in 1984.

The soils and climate of the survey area are well suited to most of the crops that are commonly grown in the county and to some specialty crops, such as strawberries, sweet corn, and melons, which are not commonly grown.

Well drained soils that warm up early in the spring are well suited to many vegetables and fruit crops. Examples are Billett and Kalamazoo soils that have slopes of less than 6 percent. Crops can generally be

planted and harvested earlier on these soils than on the other soils in the county.

Most of the well drained soils are suitable for orchard and nursery plants. Soils in low positions where frost is frequent and air drainage is poor, however, generally are poorly suited to early vegetables, small fruits, and orchards.

The latest information about crops can be obtained from the local offices of the Cooperative Extension Service or the Natural Resources Conservation Service.

The main concerns in managing the cropland and pasture in Tippecanoe County are drainage, water erosion, soil blowing, fertility, and tilth.

Drainage is the major concern on about 70 percent of the cropland and pasture in the county. The poorly drained and very poorly drained soils, such as Treaty, Drummer, and Mahalasville soils, generally have been adequately drained for agricultural production (fig. 11). A few areas of these soils, however, cannot be economically drained. These are depressional areas where drainage ditches would have to be deep and extended for great distances. An artificial drainage system is needed in areas of the somewhat poorly drained Crosby, Fincastle, Starks, Toronto, and Millbrook soils for optimum crop production.

The design of surface and subsurface drainage systems varies with the kind of soil. A combination of a surface drainage system and tile drainage generally is needed if the very poorly drained soils are used for the intensive production of row crops. The drains should be more closely spaced in areas of slowly permeable soils, such as Crosby soils, than in areas of more permeable soils, such as Drummer and Sleeth soils.

Erosion is the major concern on about 20 percent of the cropland and pasture in Tippecanoe County. It is a hazard in areas where the slope is more than 2 percent. Productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging on soils that are only moderately deep to glacial till, such as Marker, Miami, and Octagon soils. It is also damaging in areas where the soils have a layer in or below the subsoil that limits the depth of the root zone. An example is the bedrock underlying High Gap Variant and Shadeland soils. Erosion reduces productivity even more on soils that tend to be droughty, such as Kosciusko soils. If the subsoil is clayey and most of the topsoil has been lost, preparing a good seedbed and tilling are difficult. Erosion also results in the sedimentation of streams. Nutrients and farm-applied chemicals may adhere to the eroding soil particles and be washed from the field along with the runoff. Controlling erosion minimizes this pollution and improves the quality of water for municipal and recreational uses and for fish and wildlife.

Erosion-control measures provide a protective cover, reduce the runoff rate, and increase the rate of water infiltration. A cropping system that keeps a plant cover on the surface for extended periods can hold soil losses to an amount that will not reduce the productive capacity of the soils. On livestock farms, where part of the acreage is used for pasture and hay, including legumes and grasses in the cropping sequence helps to control erosion in sloping areas. The grasses and legumes also provide nitrogen and improve tilth for the following crop.

The slopes are so short and irregular on much of the sloping soils in the county that contour farming and terraces are generally not practical. On these soils, a system of conservation tillage or a cropping system that provides a substantial cover of vegetation is needed to control erosion. Conservation tillage leaves crop residue on the surface, increases the rate of water infiltration, and helps to control runoff and erosion.

No-till farming of both corn and soybeans is being used increasingly by the farmers in the county. It is the single most effective erosion-control practice. This method of tillage is suitable for the moderately coarse textured and coarse textured, more sloping soils that warm up early in the spring. These soils are generally the most susceptible to erosion and thus need the most protection. No-till also works well on most of the soils if the new crop is planted into soybean stubble because the light cover of residue from soybeans allows the soils to warm up relatively early in the spring.

Ridge-till is another important type of conservation tillage system. It has great potential for increased use in Tippecanoe County. Studies have indicated that ridge-till is currently the most profitable system of farming. It is well adapted to nearly all of the soils in the county. Favorable factors include low power requirements, a need for lower amounts of chemical herbicides, savings of time and fuel, improvement of tilth, effective erosion control, and greater net profits. The cost of equipment changes may be a concern when this practice is adopted.

Chiseling is the most widely used method of conservation tillage in Tippecanoe County. It has high power requirements and results in major soil disturbance, but its similarity to plowing may account for its popularity. Unless the chiseling is done across the slope and crop residue is left on at least 30 percent of the surface, the effectiveness of this system in controlling erosion may be reduced.

More information about conservation tillage systems is provided in table 6.

Parallel tile outlet (PTO) terraces reduce the length of slopes and thus are effective in controlling sheet, rill,

Figure 11.—Harvesting corn in an area of Drummer soils. These soils have been adequately drained for the production of crops.

and gully erosion. They are most effective in areas of deep, well drained soils that are highly susceptible to erosion.

Water- and sediment-control basins can be used in much the same manner as PTO terraces. They consist of low earthfill dams across drainageways with tile outlets. They are installed singly or in series, depending on the site. They are set across the drainageways in a direction parallel to the farming rows and will accommodate straight-row farming with large equipment. The benefits of terraces and water- and sediment-control basins include minimizing the loss of soil and the associated loss of fertilizer elements; reducing the extent of sedimentation, which damages crops, watercourses, and offsite areas; and reducing the need for grassed waterways, which take land out of production of row crops. Soils that have bedrock within a depth of 40 inches or that have a clayey subsoil are less suited to terraces and diversions than other soils.

Grassed waterways are needed in many sloping areas, such as some areas of Miami and Octagon soils, and in many places where a large watershed drains across areas of Toronto-Millbrook complex, 0 to 2 percent slopes, and areas of Drummer soils. A subsurface drainage system generally is needed if the waterways are established in areas of these map units. Also, tile drainage is needed in the waterways established in many seepy areas of Toronto-Octagon complex, 2 to 6 percent slopes, eroded, along drainageways.

Because of the large number of open ditches in the county, many grade-stabilization structures are needed. These structures help to control erosion in areas where surface water drains into an open ditch. They may also be needed in some open ditches where, because of the grade, the water moves so rapidly that erosion is a

problem on the sides and bottom of the channels.

Soil blowing is a hazard on soils in Tippecanoe County that are plowed in the fall. Soil blowing can be controlled by maintaining a cover of plants or a surface mulch or by maintaining a rough surface by using proper tillage methods. Windbreaks of adapted trees and shrubs also are effective in controlling soil blowing.

Information about the erosion-control and drainage measures suitable for each kind of soil is available at the local office of the Natural Resources Conservation Service.

Soil fertility is affected by the content of plant nutrients and by reaction. On all of the soils in the county, plants respond well to nitrate, phosphate, and potash fertilizers. On most soils, applications of ground limestone are needed to raise the pH to a level that is optimum for the growth of crops. On all soils, the amount of lime and fertilizer to be applied should be based on the results of soil tests, on the needs of the crop, and on the expected level of yields. The Cooperative Extension Service can help to determine the kind and amount of fertilizer and lime needed.

Soil tilth is an important factor affecting the germination of seeds and the infiltration of water into the soil. Soils that have good tilth are granular and porous.

Many of the soils in the county have a surface layer that is predominantly silt loam and that has a moderately low to high content of organic matter. The structure of these soils is moderate or weak, and intense rainfall can cause crusting of the surface. The hard crust reduces the infiltration rate, thereby increasing the runoff rate. These soils tend to dry out slowly and can easily become compacted. Regular additions of crop residue, manure, and other organic material improve soil structure and help to prevent crusting.

Soils on the prairie, which were once mainly grassland, and soils in prairie-intergrade areas, which were once grassland with scattered trees, generally have a moderate or high content of organic matter, are relatively dark, and have better natural tilth. These soils warm up more quickly in the spring than some other soils and are less likely to form a crust or to become compacted.

Tilth is a problem in areas where a clayey subsoil is exposed as a result of severe erosion. Conservation practices are needed in these areas to control erosion and improve tilth. Regular additions of crop residue, manure, and other organic material improve soil structure and tilth in these areas.

Tilth is also a problem in areas of dark soils in depressions, such as Mahalasville, Treaty, Milford, and Drummer soils. These soils often stay wet until late in the spring. If plowed when wet, they tend to become very cloddy when they dry. As a result of this cloddiness, preparing a seedbed is difficult. A subsurface drainage system commonly improves tilth in these areas. Using a ridge-till system for several consecutive years is also very effective in improving tilth in these areas.

Specialty crops grown in Tippecanoe County include seed corn and popcorn. The latest information about growing specialty crops is available at the local offices of the Cooperative Extension Service and the Natural Resources Conservation Service.

Tillage Adaptability

By William P. Martin, district conservationist, Natural Resources Conservation Service, and Jerry V. Mannering, extension agronomist and professor of agronomy, Purdue University.

Table 6 rates the adaptability of several kinds of conservation tillage for the soils in the county. This table is a county-level, partial adaptation of the Purdue University publication AY-210 (Galloway and others, 1977).

Conservation tillage is a form of noninversion tillage that retains a protective cover of crop residue or mulch on the surface throughout the year. Leaving at least 30 percent of the surface covered by residue after planting is necessary to control water erosion. In areas where soil blowing is the primary concern, at least 1,000 pounds of flat small-grain residue equivalent should be left on the surface. Chiseling, no-till, ridge-till, and other types of noninversion tillage are examples of conservation tillage systems.

Fall moldboard plowing generally includes chopping or discing stalks before plowing. Some farmers purposely omit this operation and sometimes remove cover boards, which results in a slight surface residue cover after plowing. In the spring, two or more shallow tillage operations with a disc, field cultivator, or harrow prepare the seedbed. In some cases, the final tillage may be combined with planting. This practice essentially leaves the soil bare throughout the winter. It is suited to nearly level, wet, dark soils that are not subject to soil blowing. It increases the vulnerability of moderately coarse textured and coarse textured soils or of soils that are more sloping to soil blowing or water erosion.

In *spring moldboard plowing,* secondary tillage is similar to that for fall plowing but additional operations may be needed to break the clods sufficiently. A cultimulcher or rotary tiller is often used for final fitting. Erosion concerns are similar to those for fall plowing.

A *fall chisel* operation generally employs chisel points 2 inches wide and spaced 12 to 15 inches apart for tilling to a depth of 8 to 10 inches. Stalks are usually

chopped or disced before chiseling unless coulters are mounted in front of the chisel plow. Spring seedbed preparation should be minimal and limited to the amount necessary to smooth out the surface for planting. The soil surface remains cloddy over the winter, and 30 to 50 percent is covered with residue. After planting, 10 to 30 percent of the surface may remain covered with residue.

In this table, the term "chisel" is used in lieu of "mulch-till" because of its predominant use in the county. Although a disc may be used instead of a chisel, chiseling is by far the most commonly used form of mulch-till used in the county. Mulch-till, however, is the terminology preferred by the Conservation Technology Information Center (CTIC). Also, strip-till is not included in the table because the CTIC definition of this system includes in-row tillage at planting time, which is not practiced in Tippecanoe County.

Spring chisel tillage on moderately well drained and well drained soils is the same as for fall chisel tillage. On poorly drained and somewhat poorly drained soils, however, spring chiseling is commonly limited to a shallow depth because of the wetness. Secondary tillage should be limited to the amount necessary to smooth out the seedbed for planting.

In a *slot-plant* no-till system, stalks of the previous corn crop can either be left intact or chopped and left on the surface of the soil. At planting, a strip 1 to 3 inches wide is prepared in the row. The most popular tools for preparing the strips are nonpowered, fluted or straight coulters in front of the planter units. Disc openers and ribbed press wheels are usually necessary to firm the seed in the tilled slot. Because all residue remains on the surface, the cover may vary from 60 to 90 percent, depending on the amount of residue from the previous crop, the method of harvesting, and the width of the tilled strip. Weed control is accomplished primarily with herbicides. For solid-seeding no-till soybeans, special no-till grain drills are used.

In a no-till system that involves *residue-cleared rows,* the previous crop residue, generally corn, is cleared from a narrow 8-inch band centered on the planting row. The crop is then planted in the slot as in the slot-plant system. At planting time the residue is cleared from the row with a row cleaner. This step promotes earlier warming of the soil and results in more vigorous early-season growth of the young seedlings. Because residue is cleared from a band over the row, the cover may vary from 50 to 80 percent, depending on the amount of residue from the previous crop, the method of harvesting, and the width of the cleared planting row. This adaptation of no-till farming is still being investigated, and possible advantages are not yet supported by hard research data. Commercial no-till corn planters with row cleaners capable of clearing a residue-free area are available. Innovative farmers are adapting other existing equipment for this use.

Ridge-till, also known as ridge-plant or till-plant, is a once-over operation performed in the spring. Seeds are planted in ridges made the previous year, usually at cultivating time (fig. 12). The soil is undisturbed prior to planting. Wide sweeps or row-cleaning discs on or ahead of the planter remove the top 1 to 3 inches of the ridge and push clods and corn stubble in between the rows. Seed is dropped and firmed into moist soil behind the sweeps or discs by packer wheels. With some planters, small covering discs then move loose soil over the seed. Ridges 4 to more than 6 inches high, depending on row width, can be made in the row at cultivation, commonly with a cultivator made especially for this purpose with large sweeps and disc-hillers. Weed control is accomplished by a combination of herbicides and cultivation.

If the ridges are formed at cultivation time, all residue remains on the surface throughout the winter. About 20 to 35 percent remains after planting, and the soil clods and corn residue are concentrated between rows. Therefore, the row area may form an erosive water channel if seeds are planted up and down the slope. Most experienced ridge-till planters have found that this problem is not significant after 3 to 5 years of soil reconditioning resulting from the continual incorporation of crop residue into the surface layer. Ridge-till is a much more effective conservation practice if used after a corn crop rather than after a soybean crop. Aerially seeding a cover crop of rye or wheat around the 1st of September in soybeans can reduce soil losses in ridged bean stubble, but chemical vegetative control will be necessary in the spring.

The tillage system is rated *good* if it is highly adapted by all applicable standards or if it is well adapted but limitations may occur at low frequency over a small part of an area. For example, slower warming may delay plant growth in the spring or moderate erosion may occur as a result of severe storms. The limitations can be overcome with good management. This rating coincides with ratings 1 and 2 in Purdue University publication AY-210 (Galloway and others, 1977).

The tillage system is rated *fair* if limitations similar to those described above occur more frequently or over a wider area. Management is more difficult, but the limitations can be overcome. This rating coincides with rating 3 in Purdue University publication AY-210 (Galloway and others, 1977).

The tillage system is rated *poor* if limitations occur more frequently or over a wider area than those where the system is rated fair. The system may also be unadaptable if limitations occur very frequently or over

Figure 12.—Ridge-till corn and soybeans planted in strips in an area of Toronto-Millbrook complex, 0 to 2 percent slopes.

an entire area. This rating coincides with ratings 4 and 5 in Purdue University publication AY-210 (Galloway and others, 1977).

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 7. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity

of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 7 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is shown in table 8. The capability classification of the map units in this survey area is given in the section "Detailed Soil Map Units" and in the yields table.

Woodland Management and Productivity

David F. Berna, forester, Natural Resources Conservation Service, helped prepare this section.

Table 9 can be used by woodland owners or forest managers in planning the use of soils for wood crops (fig. 13). Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, which the indicator species can produce. The number 1 indicates low potential productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness; *W*, excess water in or on the soil; *T*, toxic substances in the soil; *D*, restricted rooting depth; *C*, clay in the upper part of the soil; *S*, sandy texture; *F*, a high content of rock fragments in the soil; and *N*, snowpack. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one

Figure 13.—A walnut plantation in an area of Bowes silt loam, 0 to 2 percent slopes.

limitation, the priority is as follows: R, X, W, T, D, C, S, F, and N.

In table 9, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, and fire lanes and in log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that

erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment and season of use are not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Windthrow hazard is the likelihood that trees will be uprooted by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions that affect rooting are a seasonal high water table and the depth to bedrock, a fragipan, or other limiting layers. A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can be blown down during periods when the soil is wet and winds are moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *productivity class*. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *productivity class*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic meters per hectare per year, indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

The first species listed under *common trees* for a soil is the indicator species for that soil. It generally is the most common species on the soil and is the one that determines the ordination class.

Trees to plant are those that are suitable for commercial wood production.

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 10 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 10 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Natural Resources Conservation Service or the Cooperative Extension Service or from a commercial nursery.

Recreation

The soils of the survey area are rated in table 11 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 11, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or a combination of these measures.

The information in table 11 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 14 and interpretations for dwellings without basements and for local roads and streets in table 13.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

James D. McCall, biologist, Natural Resources Conservation Service, helped prepare this section.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 12, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or

kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, soybeans, oats, and sorghum.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, timothy, orchardgrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, ragweed, docks, crabgrass, and dandelion.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, wild cherry, black walnut, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and elderberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, elderberry, chokecherry, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, pheasant, dove, woodcock, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and white-tailed deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, kingfishers, muskrat, mink, and beaver.

Not rated in the table but of prime importance for birds and mammals is *edge habitat*. This habitat occurs where one type of major land use cover ends and another begins. Species ranging from the smallest songbirds to white-tailed deer use edge habitat. Most of the plants and animals that inhabit openland areas and woodland are also in areas of edge habitat. Desirable edge habitats are consistently used by about 10 times more wildlife than are the center of large fields or either woodland or cropland. A good example of edge habitat is an area where the outside edge of a dense woodland parallels the outside edge of a no-till field of corn.

Engineering

Jeff Healy, state conservation engineer, Natural Resources Conservation Service, helped prepare this section.

This section provides information for planning land uses related to urban development and to water

management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 13 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock or to a very firm dense layer, stone content, soil texture, and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding or ponding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, ponding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock, large stones, slope, ponding, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface

and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock, a high water table, flooding or ponding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock, and the available water capacity in the upper 40 inches affect plant growth. Flooding or ponding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 14 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 14 also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface drains or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock, and flooding or ponding affect absorption of the effluent. Large stones and bedrock interfere with installation. Most of the soils in Tippecanoe County have either moderate or severe limitations affecting septic tank absorption fields. Some of the limitations can be overcome by using alternative systems.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravelly sand or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 14 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock, ponding or flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater or ponded water overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope and bedrock can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in

successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in table 14 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, a high water table, slope, and flooding or ponding affect both types of landfill. Texture, stones and boulders, highly organic layers, and soil reaction affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 15 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing (fig. 14). They are used in many kinds of construction. Specifications for each use vary widely. In table 15, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight,

Figure 14.—A sand and gravel pit in an area of Carmi loam, 0 to 2 percent slopes.

large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are naturally fertile or

Figure 15.—A grassed waterway in an area of Drummer soils.

respond well to fertilizer and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel or stones, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel or stones, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 16 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders or organic matter. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table and permeability of the aquifer. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock, large stones, slope, and the hazard of cutbanks caving. Availability of drainage outlets is not considered in the ratings.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity (fig. 15). Large stones, wetness, slope, and depth to bedrock affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

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Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 21.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

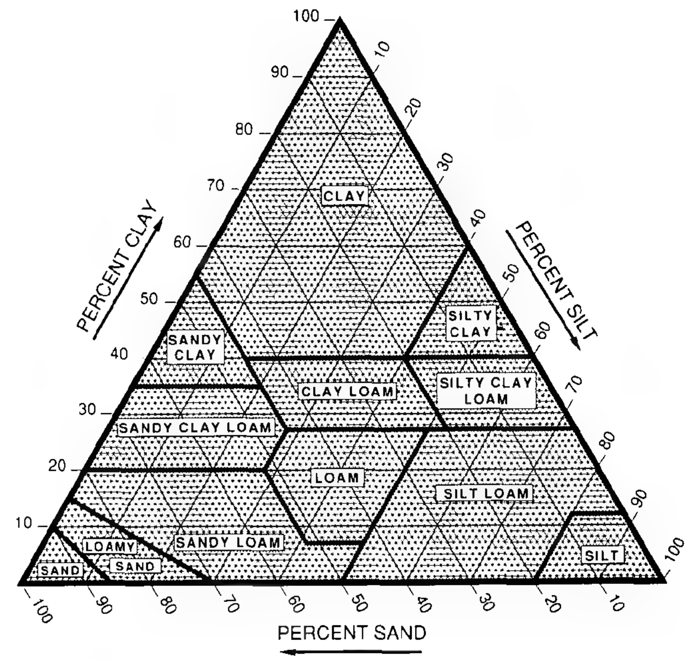

Figure 16.—Percentages of clay, silt, and sand in the basic USDA soil textural classes.

Engineering Index Properties

Table 17 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter (fig. 16). "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 1993) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 1986).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified

as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 18 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at ⅓-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for

fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. Soils are grouped according to the following distinctions:

1. Coarse sands, sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, and sapric soil material. These soils are very highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams. These soils are erodible. Crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control soil blowing are used.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material. These soils are slightly erodible. Crops can be grown if measures to control soil blowing are used.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay. These soils are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material. These soils are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.

8. Soils that are not subject to soil blowing because of coarse fragments on the surface or because of surface wetness.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 18, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Tables 19 and 20 give estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained

sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in table 19, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary inundation of an area, is caused by overflowing streams, or by runoff from adjacent slopes. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 19 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 days to 1 month, and *very long* if more than 1 month. Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 19 are depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 19.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

In table 20, *depth to bedrock* is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. Table 20 shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and

is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low, moderate,* or *high.* It is based on soil texture and acidity.

Engineering Index Test Data

Table 21 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are representative of the series described in the section "Soil Series and Their Morphology." The soil samples were tested by the State Highway Department of Indiana, Division of Materials and Tests.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 422 (ASTM), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 4318 (ASTM); Plasticity index—T 90 (AASHTO), D 4318 (ASTM); and Moisture density—T 99 (AASHTO), D 698 (ASTM).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (USDA, 1975). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 22 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Alfisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udalf (*Ud*, meaning humid, plus *alf*, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludalfs (*Hapl*, meaning minimal horizonation, plus *udalf*, the suborder of the Alfisols that has a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludalfs.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, mesic Typic Hapludalfs.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the underlying material can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (USDA, 1993). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (USDA, 1975). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Allison Series

The Allison series consists of very deep, well drained, moderately permeable soils on flood plains.

These soils formed in silty alluvium. Slopes range from 0 to 2 percent.

Allison soils are similar to Battleground soils and are commonly adjacent to Du Page, Ross, Sawabash, and Tice soils. Battleground soils have a dark surface layer less than 24 inches thick. Du Page and Ross soils have more sand in the subsoil than the Allison soils. Du Page soils are in the slightly lower positions on the landscape, and Ross soils are in the slightly higher positions. Sawabash soils have a dominantly gray subsoil. Tice soils have gray mottles in the upper part of the subsoil. Sawabash and Tice soils are in the lower lying areas.

Typical pedon of Allison silt loam, frequently flooded, in a cultivated field; 160 feet east and 2,450 feet north of the southwest corner of sec. 30, T. 23 N., R. 5 W.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; common fine roots; slight effervescence; moderately alkaline; abrupt smooth boundary.

A1—10 to 18 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium subangular blocky structure; firm; common very fine roots; common very fine pores; thin continuous black (10YR 2/1) organic coatings on faces of peds; moderately alkaline; gradual smooth boundary.

A2—18 to 33 inches; very dark gray (10YR 3/1) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate very fine subangular blocky structure; firm; few very fine roots; common very fine pores; thin continuous black (10YR 2/1) organic coatings on faces of peds; moderately alkaline; gradual smooth boundary.

A3—33 to 51 inches; very dark grayish brown (10YR 3/2) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate very fine subangular blocky structure; firm; common very fine pores; thin continuous black (10YR 2/1) organic coatings on faces of peds; moderately alkaline; gradual smooth boundary.

BA—51 to 58 inches; dark brown (10YR 3/3) silty clay loam, dark brown (10YR 4/3) dry; moderate fine subangular blocky structure; firm; common very fine pores; thin discontinuous black (10YR 2/1) organic coatings on faces of peds; moderately alkaline; gradual smooth boundary.

Bw—58 to 80 inches; dark brown (10YR 4/3) silty clay loam; moderate fine subangular blocky structure; firm; few very fine pores; thin discontinuous very dark grayish brown (10YR 3/2) organic coatings on faces of peds; moderately alkaline.

The solum is more than 60 inches thick. The thickness of the mollic epipedon ranges from 24 to 60 inches.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. It is silt loam or silty clay loam.

The Bw horizon has hue of 10YR and value and chroma of 3 or 4. It is silt loam or silty clay loam.

Alvin Series

The Alvin series consists of very deep, well drained, moderately rapidly permeable soils on outwash plains, terraces, till plains, and recessional moraines. These soils formed in sandy sediments. Slopes range from 2 to 6 percent.

Alvin soils are commonly adjacent to Mahalasville, Spinks, Treaty, and Whitaker soils. Mahalasville and Treaty soils have a dark surface layer and a gray subsoil. Spinks soils have less clay in the solum than the Alvin soils. Whitaker soils have gray mottles in the upper part of the subsoil. They are on toe slopes.

Typical pedon of Alvin fine sandy loam, in an area of Alvin-Spinks complex, 2 to 6 percent slopes, eroded, in a cultivated field; 2,380 feet east and 1,360 feet north of the southwest corner of sec. 14, T. 22 N., R. 5 W.

Ap—0 to 10 inches; dark brown (10YR 4/3) fine sandy loam, brown (10YR 5/3) dry; common coarse dark brown (7.5YR 4/4) pockets of material from the subsoil; moderate medium granular structure; friable; common very fine roots; medium acid; abrupt smooth boundary.

Bt1—10 to 27 inches; dark brown (7.5YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable; common very fine roots; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt2—27 to 38 inches; dark brown (7.5YR 4/4) sandy loam; weak medium subangular blocky structure; friable; common very fine roots; thin continuous dark brown (7.5YR 3/4) clay films on faces of peds; medium acid; gradual smooth boundary.

E&Bt3—38 to 80 inches; dark brown (7.5YR 4/4) loamy sand that has pockets of sandy loam; weak coarse subangular blocky structure; friable; thin discontinuous dark brown (7.5YR 3/4) clay films on faces of peds; medium acid.

The solum is more than 80 inches thick.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 or 3. It is fine sandy loam or sandy loam.

The Bt and E&Bt horizons have hue of 7.5YR, value of 4 or 5, and chroma of 4 to 6.

Battleground Series

The Battleground series consists of very deep, well drained, moderately permeable soils on flood plains. These soils formed in silty alluvium. Slopes range from 0 to 2 percent.

Battleground soils are similar to Allison soils and are commonly adjacent to Lash, Sawabash, and Tice soils and the Ouiatenon soils that have a sandy substratum. Allison soils have a dark surface layer more than 23 inches thick. Lash and Ouiatenon soils have more sand and less clay in the subsoil than the Battleground soils. They are adjacent to stream channels. Sawabash soils have a dominantly gray subsoil. Tice soils have gray mottles in the upper part of the subsoil. Sawabash and Tice soils are in the lower lying areas.

Typical pedon of Battleground silt loam, frequently flooded, in a cultivated field; 560 feet west and 1,475 feet south of the northeast corner of sec. 34, T. 23 N., R. 5 W.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; moderate medium granular structure; friable; common fine roots; slight effervescence; moderately alkaline; abrupt smooth boundary.

A—10 to 19 inches; very dark grayish brown (10YR 3/2) silty clay loam, brown (10YR 5/3) dry; moderate fine subangular blocky structure; firm; common very fine roots; common very fine pores; thin continuous black (10YR 2/1) organic coatings on faces of peds; slight effervescence; moderately alkaline; gradual smooth boundary.

Bw1—19 to 34 inches; dark brown (10YR 3/3) silty clay loam, pale brown (10YR 6/3) dry; moderate fine subangular blocky structure; friable; few very fine roots; common very fine pores; thin continuous very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slight effervescence; moderately alkaline; gradual smooth boundary.

Bw2—34 to 52 inches; dark brown (10YR 3/3) silt loam, pale brown (10YR 6/3) dry; moderate fine subangular blocky structure; friable; common very fine pores; thin continuous very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slight effervescence; moderately alkaline; gradual smooth boundary.

Bw3—52 to 80 inches; dark brown (10YR 4/3) silt loam; moderate fine subangular blocky structure; friable; common very fine pores; thin discontinuous dark brown (10YR 3/3) organic coatings on faces of peds; strong effervescence; moderately alkaline; gradual smooth boundary.

The solum is more than 60 inches thick. It is mildly alkaline or moderately alkaline and has carbonates in all horizons. The thickness of the mollic epipedon ranges from 10 to 23 inches.

The Ap and A horizons have hue of 10YR, value of 3, and chroma of 2 or 3.

The Bw horizon has hue of 10YR and value and chroma of 3 or 4.

Beecher Series

The Beecher series consists of somewhat poorly drained, slowly permeable soils on recessional moraines. These soils are deep over compact glacial till. They formed in silty material and in the underlying silty glacial till. Slopes range from 0 to 2 percent.

Beecher soils are commonly adjacent to Drummer and Marker soils. Drummer soils have a dominantly gray subsoil. They are in drainageways and depressions. Marker soils have a browner subsoil than the Beecher soils. They are in the more sloping areas along drainageways and on rises.

Typical pedon of Beecher silt loam, 0 to 2 percent slopes, in a cultivated field; 1,600 feet west and 1,680 feet south of the northeast corner of sec. 15, T. 24 N., R. 5 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; slightly acid; abrupt smooth boundary.

Bt1—9 to 12 inches; olive brown (2.5Y 4/4) silty clay loam; common medium distinct dark grayish brown (10YR 4/2) mottles; moderate medium subangular blocky structure; firm; common very fine pores; thin patchy dark grayish brown (10YR 4/2) clay films on faces of peds; thin continuous very dark gray (10YR 3/1) organic coatings on faces of peds; medium acid; clear smooth boundary.

Bt2—12 to 16 inches; light olive brown (2.5Y 5/4) silty clay loam; common medium distinct dark grayish brown (10YR 4/2) mottles; weak fine prismatic structure parting to moderate medium subangular blocky; firm; common very fine pores; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; thin discontinuous very dark grayish brown (10YR 3/2) organic coatings on faces of peds; medium acid; clear smooth boundary.

Bt3—16 to 24 inches; light olive brown (2.5Y 5/4) silty clay loam; common medium distinct dark grayish brown (10YR 4/2) and yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; many very fine pores; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; strongly acid; clear smooth boundary.

Bt4—24 to 31 inches; light olive brown (2.5Y 5/4) silty clay loam; common medium distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/8) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; many very fine pores; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; slightly acid; clear smooth boundary.

2Bt5—31 to 41 inches; light olive brown (2.5Y 5/4) silty clay loam; common medium distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/8) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; many very fine pores; thin discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds and continuous very dark grayish brown (10YR 3/2) clay films lining pores; 1 percent gravel; neutral; clear smooth boundary.

2BCt—41 to 44 inches; light olive brown (2.5Y 5/4) silty clay loam; common medium distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; firm; many very fine pores; thin discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; 2 percent gravel; slight effervescence; mildly alkaline; clear wavy boundary.

2Cd—44 to 60 inches; light olive brown (2.5Y 5/4) silty clay loam; common medium prominent gray (N 6/0) mottles; massive; very firm; 2 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 36 to 45 inches.

The Ap horizon has hue of 10YR, value of 3, and chroma of 1 or 2.

The Bt horizon has hue of 2.5Y or 10YR, value of 4 or 5, and chroma of 2 to 4. Reaction ranges from very strongly acid to slightly acid.

The 2Bt horizon has hue of 2.5Y or 5Y, value of 5, and chroma of 2 to 4.

The 2Cd horizon has hue of 5Y or 2.5Y, value of 5, and chroma of 3 or 4.

Berks Series

The Berks series consists of well drained soils that are moderately deep to interbedded siltstone and shale bedrock. Permeability is moderate in the upper part of the subsoil and moderately rapid in the lower part. These soils formed in residuum on steep upland hillslopes. Slopes range from 25 to 60 percent.

Berks soils are commonly adjacent to High Gap Variant soils. High Gap Variant soils have an argillic horizon. They formed in glacial drift and in the underlying siltstone residuum. They are on the upper part of side slopes in the less sloping areas at the higher elevations.

Typical pedon of Berks channery silt loam, 25 to 60 percent slopes, in a wooded area; 1,190 feet east and 1,240 feet north of the southwest corner of sec. 3, T. 22 N., R. 6 W.

A—0 to 3 inches; very dark grayish brown (10YR 3/2) channery silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; many very fine roots; 20 percent channers; slightly acid; clear smooth boundary.

E—3 to 8 inches; brown (10YR 4/3) channery silt loam; moderate fine subangular blocky structure; friable; many very fine roots; many very fine pores; 30 percent channers; very strongly acid; clear smooth boundary.

Bw1—8 to 17 inches; light yellowish brown (10YR 6/4) very channery silt loam; moderate fine subangular blocky structure; friable; common very fine roots; common very fine pores; 55 percent channers; very strongly acid; clear smooth boundary.

Bw2—17 to 29 inches; pale brown (10YR 6/3) channery silt loam; moderate medium subangular blocky structure; firm; common very fine roots; common very fine pores; 30 percent channers; very strongly acid; clear wavy boundary.

Cr—29 to 60 inches; interbedded siltstone and shale bedrock.

The thickness of the solum ranges from 20 to 40 inches.

The A horizon has hue of 10YR, value of 3, and chroma of 1 or 2.

The Bw horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 or 4. Reaction ranges from extremely acid to slightly acid.

Billett Series

The Billett series consists of well drained and moderately well drained soils on terraces, sand dunes, outwash plains, till plains, and recessional moraines. The Billett soils that have a gravelly substratum are deep over gravelly coarse sand. The moderately wet phase is very deep. Permeability is moderately rapid in the upper part of the solum in the Billett soils that have a gravelly substratum, rapid in the lower part of the solum, and very rapid in the underlying material. It is moderately rapid in the moderately wet phase. Billett soils formed in loamy outwash and in the underlying gravelly outwash. Slopes range from 0 to 8 percent.

Billett soils are similar to Carmi and Elston soils and are commonly adjacent to La Hogue, Oakville, Rodman, and Troxel soils. Carmi and Elston soils have a dark

surface layer 10 or more inches thick. La Hogue soils have gray mottles in the upper part of the subsoil. They are in the lower lying areas. Oakville soils have less clay in the subsoil than the Billett soils. They are in the higher lying areas. Rodman soils have less clay in the subsoil and have a thinner solum than the Billett soils. They are in steep areas along terrace breaks and streams. Troxel soils have a dark surface layer 24 or more inches thick. They are in drainageways or depressions.

Typical pedon of Billett loam, gravelly substratum, 0 to 2 percent slopes, in a cultivated field; 590 feet west and 1,190 feet south of the northeast corner of sec. 11, T. 23 N., R. 4 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) loam, dark brown (10YR 4/3) dry; moderate medium granular structure; friable; medium acid; abrupt smooth boundary.

Bt1—9 to 14 inches; dark brown (10YR 4/3) loam; weak medium platy structure parting to moderate fine subangular blocky; friable; common fine pores; thin continuous very dark grayish brown (10YR 3/2) clay films on faces of peds; neutral; clear smooth boundary.

Bt2—14 to 20 inches; dark brown (10YR 4/3) loam; moderate medium subangular blocky structure; friable; common fine pores; thin continuous very dark grayish brown (10YR 3/2) clay films on faces of peds; neutral; clear smooth boundary.

2Bt3—20 to 27 inches; dark brown (7.5YR 3/4) loam; moderate medium subangular blocky structure; friable; common fine pores; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; 9 percent gravel; neutral; clear smooth boundary.

2Bt4—27 to 38 inches; dark brown (7.5YR 3/4) sandy loam; moderate medium and coarse subangular blocky structure; friable; common fine pores; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; 7 percent gravel; slightly acid; clear smooth boundary.

2Bt5—38 to 51 inches; dark brown (7.5YR 4/4) loamy sand; weak coarse subangular blocky structure; very friable; thin discontinuous dark brown (7.5YR 3/2) clay films on faces of peds; 1 percent gravel; slightly acid; gradual smooth boundary.

2Bt6—51 to 56 inches; dark brown (7.5YR 4/4) loamy sand; weak coarse subangular blocky structure; very friable; thin discontinuous dark brown (7.5YR 3/2) clay films on faces of peds; 8 percent gravel; neutral; clear wavy boundary.

3C—56 to 70 inches; yellowish brown (10YR 5/4) gravelly coarse sand; single grained; loose; 20 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 60 inches.

The Ap horizon has hue of 10YR, value of 3, and chroma of 2 or 3. It is loam or fine sandy loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is loam, fine sandy loam, or sandy loam. Reaction ranges from strongly acid to neutral.

The 2Bt horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 4 to 6. It is loam, fine sandy loam, sandy loam, loamy fine sand, or loamy sand. Reaction ranges from strongly acid to neutral.

The 3C horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. In some pedons it is stratified.

Bowes Series

The Bowes series consists of well drained soils on outwash plains. These soils are deep or very deep over gravelly coarse sand. Permeability is moderate in the upper part of the subsoil, moderately rapid in the lower part of the solum, and very rapid in the underlying material. The soils formed in silty material and in the underlying gravelly outwash. Slopes range from 0 to 2 percent.

Bowes soils are similar to Waupecan soils and are commonly adjacent to Bowes Variant and Lafayette soils and to the Mahalasville soils that have a gravelly substratum. Waupecan soils have a dark surface layer 10 or more inches thick. Bowes Variant soils have gray mottles in the lower part of the subsoil. They are at the slightly lower elevations. Lafayette and Mahalasville soils have a dark surface layer 10 or more inches thick. They have a mottled subsoil that is grayer than that of the Bowes soils. They are at the lower elevations or in depressions.

Typical pedon of Bowes silt loam, 0 to 2 percent slopes, in a cultivated field; 1,330 feet west and 140 feet south of the northeast corner of sec. 17, T. 22 N., R. 4 W.

Ap—0 to 9 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; moderate medium granular structure; friable; neutral; abrupt smooth boundary.

Bt1—9 to 17 inches; dark brown (10YR 4/3) silt loam; moderate fine subangular blocky structure; firm; few fine pores; thin continuous dark brown (10YR 3/3) clay films on faces of peds; slightly acid; clear smooth boundary.

Bt2—17 to 28 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky;

firm; few fine pores; thin continuous dark brown (10YR 3/3) clay films on faces of peds; strongly acid; clear wavy boundary.

2Bt3—28 to 32 inches; dark yellowish brown (10YR 4/4) clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few fine pores; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; few pebbles; strongly acid; clear wavy boundary.

2Bt4—32 to 37 inches; dark yellowish brown (10YR 4/4) sandy clay loam; moderate coarse subangular blocky structure; firm; few fine pores; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; thin patchy black (N 2/0) iron and manganese oxide stains on faces of peds; few pebbles; strongly acid; gradual wavy boundary.

2Bt5—37 to 41 inches; dark yellowish brown (10YR 4/4) fine sandy loam; moderate coarse subangular blocky structure; friable; few fine pores; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; thin patchy black (N 2/0) iron and manganese oxide stains on faces of peds; strongly acid; gradual wavy boundary.

2Bt6—41 to 49 inches; dark yellowish brown (10YR 4/4) fine sand; weak coarse subangular blocky structure; very friable; few fine pores; thin discontinuous dark brown (7.5YR 3/2) clay films on faces of peds; strongly acid; clear wavy boundary.

3Bt7—49 to 56 inches; dark brown (7.5YR 3/2) gravelly sandy clay loam; weak medium and coarse subangular blocky structure; firm; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; 33 percent gravel; medium acid; clear wavy boundary.

3C—56 to 60 inches; dark yellowish brown (10YR 4/4) gravelly coarse sand; single grained; loose; 34 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 50 to 70 inches. The thickness of the silty material ranges from 28 to 50 inches.

The Ap horizon has hue of 10YR, value of 3, and chroma of 2 or 3.

The Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. The texture ranges from silt loam in the upper part to silty clay loam in the lower part.

The 2Bt horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 6. It is clay loam, sandy clay loam, fine sand, sandy loam, or fine sandy loam. Reaction ranges from strongly acid to slightly acid.

The 3Bt horizon has hue of 7.5YR, value of 3 or 4, and chroma of 2 to 4. It is gravelly sandy clay loam, gravelly sandy loam, or gravelly loamy sand. Reaction ranges from strongly acid to mildly alkaline.

The 3C horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is stratified and commonly is coarse sand or gravelly coarse sand.

Bowes Variant

The Bowes Variant consists of moderately well drained soils on outwash plains. These soils are deep or very deep over gravelly sand. Permeability is moderate in the upper part of the subsoil, moderately rapid in the lower part of the subsoil, and very rapid in the underlying material. The soils formed in silty material and in the underlying loamy and gravelly outwash. Slopes range from 0 to 2 percent.

Bowes Variant soils are similar to the moderately wet Waupecan soils and are commonly adjacent to Bowes and Lafayette soils and to the Mahalasville soils that have a gravelly substratum. Waupecan soils have a dark surface layer 10 or more inches thick. Bowes soils do not have gray mottles in the subsoil. They are in the higher areas. Lafayette and Mahalasville soils have a dark surface layer 10 or more inches thick. They have a mottled subsoil that is grayer than that of the Bowes Variant soils. They are in low areas or in depressions.

Typical pedon of Bowes Variant silt loam, 0 to 2 percent slopes, in a cultivated field; 2,275 feet west and 1,380 feet north of the southeast corner of sec. 13, T. 22 N., R. 4 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; moderate medium granular structure; friable; many fine and very fine roots; neutral; abrupt smooth boundary.

Bt1—9 to 14 inches; dark brown (10YR 4/3) silt loam; moderate fine subangular blocky structure; firm; common very fine roots; few very fine pores; thin continuous dark brown (10YR 3/3) clay films on faces of peds; slightly acid; clear smooth boundary.

Bt2—14 to 26 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; firm; common very fine roots; common very fine pores; thin continuous dark brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.

2Bt3—26 to 30 inches; dark yellowish brown (10YR 4/4) clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few very fine roots; common very fine pores; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; 1 percent gravel; strongly acid; gradual smooth boundary.

2Bt4—30 to 43 inches; dark yellowish brown (10YR 4/4) loam; common medium distinct grayish brown

(10YR 5/2) mottles; moderate coarse subangular blocky structure; firm; few very fine pores; thin continuous dark brown (10YR 4/3) clay films on faces of peds; 5 percent gravel; very strongly acid; clear wavy boundary.

3Bt5—43 to 53 inches; dark brown (10YR 4/3) gravelly sandy loam; common medium distinct grayish brown (10YR 5/2) mottles; weak fine subangular blocky structure; very friable; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; 30 percent gravel; neutral; clear wavy boundary.

3C—53 to 60 inches; brown (10YR 5/3) gravelly sand; single grained; loose; 33 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 50 to 70 inches. The thickness of the silty material ranges from 24 to 50 inches.

The Ap horizon has hue of 10YR, value of 3, and chroma of 2 or 3.

The Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. Reaction ranges from very strongly acid to slightly acid.

The 2Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 6. It is clay loam, sandy clay loam, loam, or sandy loam. Reaction ranges from very strongly acid to slightly acid.

The 3Bt horizon has hue of 7.5YR, value of 4 or 5, and chroma of 2 to 4. It is gravelly sandy clay loam, gravelly sandy loam, or gravelly loamy sand. Reaction ranges from strongly acid to neutral.

The 3C horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4.

Brenton Series

The Brenton series consists of very deep, somewhat poorly drained, moderately permeable soils on till plains. These soils formed in loess or other silty material and in the underlying glaciofluvial deposits. Slopes are 0 to 1 percent.

Brenton soils are similar to Millbrook soils and are commonly adjacent to Drummer, Raub, and Throckmorton soils. Millbrook soils have a dark surface layer less than 10 inches thick. Drummer soils have a grayer subsoil than the Brenton soils. They are in depressions and drainageways. Raub soils are underlain by glacial till. They are at the slightly higher elevations. Throckmorton soils do not have gray mottles in the upper part of the subsoil. They are on rises and in the more sloping areas.

Typical pedon of Brenton silt loam, in an area of Raub-Brenton complex, 0 to 1 percent slopes, in a cultivated field; 275 feet east and 1,975 feet south of the northwest corner of sec. 33, T. 22 N., R. 5 W.

Ap—0 to 11 inches; very dark gray (10YR 3/1) silt loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; friable; many fine roots; neutral; abrupt smooth boundary.

Bt1—11 to 18 inches; olive brown (2.5Y 4/4) silty clay loam; common fine distinct dark grayish brown (2.5Y 4/2) mottles; moderate fine subangular blocky structure; firm; common very fine roots; common very fine pores; thin continuous dark grayish brown (2.5Y 4/2) clay films and very dark gray (10YR 3/1) organic coatings on faces of peds; slightly acid; clear smooth boundary.

Bt2—18 to 24 inches; olive brown (2.5Y 4/4) silty clay loam; common fine distinct dark grayish brown (10YR 4/2) mottles; moderate medium subangular blocky structure; firm; common very fine pores; thin continuous dark grayish brown (2.5Y 4/2) clay films on faces of peds; thin discontinuous very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; clear smooth boundary.

Bt3—24 to 29 inches; olive brown (2.5Y 4/4) silty clay loam; common medium distinct dark grayish brown (10YR 4/2) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; common very fine pores; thin continuous dark grayish brown (2.5Y 4/2) clay films on faces of peds; thin discontinuous very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; clear smooth boundary.

Bt4—29 to 38 inches; olive brown (2.5Y 4/4) silty clay loam; common medium distinct grayish brown (2.5Y 5/2) and light olive brown (2.5Y 5/6) mottles; weak coarse prismatic structure parting to weak coarse subangular blocky; firm; few very fine roots; common very fine pores; thin patchy very dark gray (10YR 3/1) organic coatings on faces of prisms; neutral; clear smooth boundary.

2Bt5—38 to 48 inches; light olive brown (2.5Y 5/4) silt loam that has pockets of sandy loam; common medium distinct grayish brown (2.5Y 5/2) and light olive brown (2.5Y 5/6) mottles; weak coarse subangular blocky structure; firm; few very fine roots; common very fine and fine pores; thin patchy dark grayish brown (2.5Y 4/2) clay films on faces of peds and lining pores; 3 percent gravel; mildly alkaline; clear wavy boundary.

2BCt—48 to 52 inches; light olive brown (2.5Y 5/4) silt loam that has pockets of sand; common medium distinct grayish brown (2.5Y 5/2) and light olive brown (2.5Y 5/6) mottles; weak coarse subangular blocky structure; firm; common very fine pores; thin patchy dark grayish brown (2.5Y 4/2) clay films on faces of peds and lining pores; 3 percent gravel;

slight effervescence; mildly alkaline; clear wavy boundary.

2C—52 to 60 inches; light olive brown (2.5Y 5/4) silt loam that has thin strata of sand; common medium distinct grayish brown (2.5Y 5/2) and light olive brown (2.5Y 5/6) mottles; massive; firm; few fine pores; 3 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the loess or silty material ranges from 24 to 40 inches.

The Ap horizon has hue of 10YR, value of 3, and chroma of 1 or 2.

The Bt horizon is mottled. It has hue of 2.5Y or 10YR, value of 4 or 5, and chroma of 2 to 4. Reaction ranges from medium acid to neutral.

The 2Bt horizon has hue of 2.5Y or 10YR, value of 4 or 5, and chroma of 2 to 6. It is silt loam or sandy loam. In some pedons it has sandy strata below a depth of 40 inches. Reaction ranges from medium acid to mildly alkaline.

The 2C horizon has hue of 2.5Y or 10YR, value of 5, and chroma of 2 to 6. The texture commonly ranges from fine sandy loam to silt loam. This horizon has strata of sand or loamy fine sand in all pedons.

Camden Series

The Camden series consists of very deep, well drained, moderately permeable soils on till plains. These soils formed in silty material and in the underlying stratified loamy outwash. Slopes range from 0 to 2 percent.

Camden soils are similar to Mellott soils and are commonly adjacent to Fincastle, Rockfield, and Starks soils. Mellott soils have a darker surface layer than the Camden soils. Fincastle, Starks, and Rockfield soils are at the slightly lower elevations. Fincastle and Starks soils have gray mottles in the upper part of the subsoil. Rockfield soils have gray mottles in the lower part of the subsoil.

Typical pedon of Camden silt loam, 0 to 2 percent slopes, in a cultivated field; 300 feet east and 1,640 feet south of the northwest corner of sec. 34, T. 23 N., R. 3 W.

Ap—0 to 9 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

Bt1—9 to 15 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine subangular blocky structure; firm; common fine roots; few fine pores; thin continuous dark brown (10YR 4/3) clay films on faces of peds; neutral; clear smooth boundary.

Bt2—15 to 22 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine and medium subangular blocky structure; firm; common fine roots; common fine pores; thin continuous dark brown (7.5YR 3/4) clay films on faces of peds; neutral; clear smooth boundary.

Bt3—22 to 29 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure; firm; common fine roots; common fine pores; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; medium acid; clear smooth boundary.

2Bt4—29 to 33 inches; dark brown (7.5YR 4/4) loam; moderate medium subangular blocky structure; firm; few fine roots; common fine pores; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; strongly acid; clear smooth boundary.

2Bt5—33 to 39 inches; dark brown (7.5YR 4/4) sandy loam; weak coarse subangular blocky structure; friable; common fine pores; thin discontinuous dark brown (7.5YR 3/2) clay films on faces of peds; medium acid; clear smooth boundary.

2Bt6—39 to 50 inches; dark brown (7.5YR 4/4) fine sandy loam that has one 3-inch layer of gravelly sandy loam; weak coarse subangular blocky structure; firm; common fine pores; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; medium acid; clear smooth boundary.

2Bt7—50 to 64 inches; dark yellowish brown (10YR 4/4) loam; common medium faint yellowish brown (10YR 5/4) mottles; weak coarse subangular blocky structure; friable; common fine pores; thin discontinuous dark brown (7.5YR 3/2) clay films on faces of peds; slightly acid; clear smooth boundary.

2C—64 to 70 inches; yellowish brown (10YR 5/4) loam that has strata of sandy loam; massive; friable; few medium very dark grayish brown (10YR 3/2) iron and manganese oxide accumulations; neutral.

The thickness of the solum ranges from 45 to 65 inches. The thickness of the silt ranges from 24 to 40 inches.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 or 3.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. Reaction ranges from strongly acid to neutral.

The 2Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is clay loam, fine sandy loam, loam, sandy clay loam, or sandy loam. Reaction ranges from strongly acid to neutral.

The 2C horizon has hue of 10YR, value of 4 or 5, and chroma of 4. It is stratified and commonly is sandy loam, loam, or silt loam.

Carmi Series

The Carmi series consists of well drained soils on terraces and outwash plains. These soils are deep over sand and very gravelly coarse sand. Permeability is moderately rapid in the solum and very rapid in the underlying material. The soils formed in loamy outwash and in the underlying gravelly outwash. Slopes range from 0 to 6 percent.

Carmi soils are similar to Elston soils and to the Billett soils that have a gravelly substratum. They are commonly adjacent to Desker, Sparta, and Troxel soils. Billett soils have a dark surface layer less than 10 inches thick. Elston soils have less gravel in the upper part of the subsoil than the Carmi soils. Desker soils have a solum that is less than 40 inches thick. They are in the more sloping areas. Sparta soils have less clay in the subsoil than the Carmi soils. They are at the higher elevations. Troxel soils have a surface layer that is 24 or more inches thick and have less sand in the upper part of the solum than the Carmi soils. They are in potholes and drainageways.

Typical pedon of Carmi sandy loam, 2 to 6 percent slopes, in a cultivated field; 1,150 feet west and 2,540 feet south of the northeast corner of sec. 36, T. 23 N., R. 6 W.

Ap—0 to 10 inches; very dark gray (10YR 3/1) sandy loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; friable; 1 percent gravel; neutral; abrupt smooth boundary.

A—10 to 13 inches; very dark gray (10YR 3/1) sandy loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; friable; common very fine pores; 1 percent gravel; strongly acid; clear smooth boundary.

Bt1—13 to 20 inches; dark brown (7.5YR 3/4) sandy loam; weak fine subangular blocky structure; friable; common very fine pores; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; thin discontinuous very dark gray (10YR 3/1) organic coatings on faces of peds; 1 percent gravel; medium acid; clear smooth boundary.

2Bt2—20 to 26 inches; dark brown (7.5YR 3/4) gravelly sandy loam; weak fine subangular blocky structure; friable; common very fine pores; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; 20 percent gravel; slightly acid; clear smooth boundary.

2Bt3—26 to 30 inches; dark brown (7.5YR 3/4) very gravelly sandy loam; weak fine subangular blocky structure; friable; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; 44 percent gravel; slightly acid; gradual smooth boundary.

2Bt4—30 to 41 inches; dark brown (7.5YR 3/4) very gravelly loamy sand; weak fine subangular blocky structure; very friable; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; 45 percent gravel; neutral; gradual smooth boundary.

2BCt—41 to 45 inches; dark brown (7.5YR 3/4) very gravelly loamy sand; weak medium granular structure; very friable; thin discontinuous dark brown (7.5YR 3/2) clay films on faces of peds; 50 percent gravel; slight effervescence; mildly alkaline; clear wavy boundary.

2C—45 to 60 inches; yellowish brown (10YR 5/4), stratified sand and very gravelly coarse sand; single grained; loose; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 60 inches.

The Ap and A horizons have hue of 10YR, value of 3, and chroma of 1 or 2. They are loam or sandy loam.

The Bt horizon has hue of 7.5YR, value of 3 or 4, and chroma of 2 to 4. It is loam, sandy clay loam, sandy loam, or loamy sand. Reaction ranges from strongly acid to neutral.

The 2Bt horizon is the gravelly or very gravelly analogs of loam, sandy loam, or loamy sand. Reaction ranges from very strongly acid to mildly alkaline.

The 2C horizon has hue of 10YR, value of 5, and chroma of 3 or 4. It is stratified and commonly is sand, gravelly sand, or very gravelly coarse sand.

Ceresco Series

The Ceresco series consists of somewhat poorly drained soils on flood plains. These soils are moderately deep or deep over gravelly sand and very gravelly sand. Permeability is moderately rapid in the solum and very rapid in the underlying material. The soils formed in alluvium. Slopes range from 0 to 2 percent.

Ceresco soils are commonly adjacent to Cohoctah and Ouiatenon soils. Cohoctah soils have a dominantly gray subsoil. They are at the slightly lower elevations and in areas adjacent to uplands. Ouiatenon soils have a brown subsoil that does not have mottles. They have less clay in the subsoil than the Ceresco soils. They are in areas adjacent to stream channels.

Typical pedon of Ceresco loam, gravelly substratum, occasionally flooded, in a cultivated field; 1,880 feet west and 540 feet south of the northeast corner of sec. 27, T. 22 N., R. 4 W.

Ap—0 to 10 inches; very dark gray (10YR 3/1) loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; friable; medium acid; abrupt smooth boundary.

A—10 to 13 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure; friable; common fine pores; thin discontinuous very dark gray (10YR 3/1) organic coatings on faces of peds; medium acid; clear smooth boundary.

Bw—13 to 20 inches; dark yellowish brown (10YR 4/4) fine sandy loam; common medium distinct dark grayish brown (10YR 4/2) mottles; weak medium subangular blocky structure; friable; common fine pores; thin discontinuous dark grayish brown (10YR 4/2) organic coatings on faces of peds; very dark gray (10YR 3/1) fillings in channels; slightly acid; clear smooth boundary.

Bg—20 to 31 inches; dark grayish brown (10YR 4/2) fine sandy loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; friable; common fine pores; thin continuous dark gray (10YR 4/1) organic coatings on faces of peds; few pebbles; neutral; clear wavy boundary.

Cg1—31 to 42 inches; grayish brown (10YR 5/2) gravelly sand; single grained; loose; 17 percent fine gravel; strong effervescence; moderately alkaline; clear smooth boundary.

Cg2—42 to 60 inches; grayish brown (10YR 5/2) very gravelly sand; single grained; loose; 46 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 30 to 60 inches. The thickness of the mollic epipedon ranges from 10 to 14 inches.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is loam or sandy loam.

The Bw horizon has hue of 10YR, value of 4, and chroma of 3 to 6. It is sandy loam or fine sandy loam. Reaction ranges from slightly acid to mildly alkaline.

The Bg horizon, if it occurs, has hue of 10YR, value of 4 or 5, and chroma of 2. Reaction ranges from slightly acid to mildly alkaline.

The Cg horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2.

Chalmers Series

The Chalmers series consists of poorly drained soils on till plains. These soils are deep over compact glacial till. Permeability is moderate in the solum and moderately slow in the underlying material. The soils formed in silty material and in the underlying glacial till. Slopes range from 0 to 2 percent.

Chalmers soils are similar to Treaty soils and are commonly adjacent to Millbrook and Toronto soils. Treaty soils have an argillic horizon. Millbrook and Toronto soils have a surface layer that is less than 10 inches thick and have a browner subsoil than the Chalmers soils. They are in the slightly higher positions on the landscape.

Typical pedon of Chalmers silty clay loam, in a cultivated field; 1,840 feet west and 2,050 feet south of the northeast corner of sec. 31, T. 23 N., R. 3 W.

Ap—0 to 9 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate medium granular structure; firm; common fine roots; medium acid; abrupt smooth boundary.

A—9 to 13 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; few fine prominent grayish brown (2.5Y 5/2) mottles; moderate fine subangular blocky structure; firm; common fine roots; slightly acid; gradual smooth boundary.

Bg1—13 to 20 inches; grayish brown (2.5Y 5/2) silty clay loam; few fine distinct olive brown (2.5Y 4/4) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; common fine roots; many fine pores; thin continuous dark gray (10YR 4/1) and very dark gray (10YR 3/1) organic coatings on faces of peds; slightly acid; gradual smooth boundary.

Bg2—20 to 30 inches; grayish brown (10YR 5/2) silty clay loam; common medium prominent light olive brown (2.5Y 5/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; common fine roots; many fine pores; thin continuous dark gray (10YR 4/1) organic coatings on faces of peds; krotovinas 2 inches in diameter filled with very dark gray (10YR 3/1) silty clay loam material; neutral; gradual smooth boundary.

2Bg3—30 to 35 inches; grayish brown (10YR 5/2) clay loam; many coarse prominent yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure parting to moderate coarse subangular blocky; firm; few fine roots; many fine pores; thin discontinuous dark grayish brown (10YR 4/2) organic coatings on faces of peds; krotovinas 2 inches in diameter filled with very dark gray (10YR 3/1) silty clay loam material; 3 percent gravel; neutral; gradual smooth boundary.

2Bg4—35 to 45 inches; grayish brown (10YR 5/2) loam; many coarse prominent yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; firm; few fine roots; many fine pores; thin patchy dark grayish brown (10YR 4/2) organic coatings on vertical faces of peds; 5 percent gravel; mildly

alkaline; gradual wavy boundary.

2Cd—45 to 60 inches; yellowish brown (10YR 5/4) loam; common medium distinct gray (10YR 6/1) and yellowish brown (10YR 5/8) mottles; weak medium platy till structure; very firm; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the silty material ranges from 24 to 40 inches.

The Ap and A horizons have hue of 10YR, value of 2 or 3, and chroma of 1.

The Bg horizon is mottled. It has hue of 2.5Y or 10YR, value of 4 or 5, and chroma of 1 or 2. It is silt loam or silty clay loam. Reaction ranges from slightly acid to mildly alkaline.

The 2Bg horizon is mottled. It has hue of 2.5Y or 10YR, value of 4 to 6, and chroma of 1 or 2. Reaction ranges from slightly acid to mildly alkaline.

The 2Cd horizon has hue of 2.5Y or 10YR, value of 5, and chroma of 1 to 4.

Cohoctah Series

The Cohoctah series consists of very poorly drained soils on flood plains. These soils are moderately deep or deep over sand and gravelly sand. Permeability is moderately rapid in the solum and very rapid in the underlying material. The soils formed in alluvium. Slopes range from 0 to 2 percent.

Cohoctah soils are commonly adjacent to Ceresco and Ouiatenon soils. Ceresco soils have a browner subsoil than the Cohoctah soils. Also, they are closer to stream channels. Ouiatenon soils have a dominantly brown subsoil. They are on flood plains adjacent to stream channels.

Typical pedon of Cohoctah fine sandy loam, gravelly substratum, rarely flooded, in a cultivated field; 990 feet south and 925 feet west of the northeast corner of sec. 28, T. 23 N., R. 3 W.

Ap—0 to 10 inches; very dark gray (10YR 3/1) fine sandy loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; firm; common fine roots; few pebbles; neutral; abrupt smooth boundary.

AB—10 to 13 inches; very dark gray (10YR 3/1) fine sandy loam, dark grayish brown (10YR 4/2) dry; few fine prominent dark yellowish brown (10YR 4/6) mottles; weak fine subangular blocky structure; firm; common fine roots; common fine pores; few pebbles; neutral; clear wavy boundary.

Bg1—13 to 21 inches; dark grayish brown (10YR 4/2) fine sandy loam; many coarse prominent yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; firm; few fine roots; common fine pores; thin continuous dark grayish brown (10YR 4/2) organic coatings on faces of peds; few pebbles; mildly alkaline; clear wavy boundary.

Bg2—21 to 28 inches; grayish brown (10YR 5/2) fine sandy loam; common medium prominent yellowish brown (10YR 5/8) mottles; weak coarse prismatic structure; friable; few fine roots; few fine pores; thin patchy discontinuous dark grayish brown (10YR 4/2) organic coatings on faces of peds and in pores; few pebbles; slight effervescence; mildly alkaline; clear wavy boundary.

BCg—28 to 32 inches; grayish brown (10YR 5/2) loamy fine sand; common medium distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; very friable; few fine roots; few fine pores; thin discontinuous dark grayish brown (10YR 4/2) organic coatings on faces of peds and in pores; slight effervescence; mildly alkaline; clear wavy boundary.

Cg1—32 to 38 inches; grayish brown (10YR 5/2) loamy sand; common medium distinct yellowish brown (10YR 5/4) mottles; weak coarse subangular blocky structure; loose; 1 percent gravel; slight effervescence; moderately alkaline; clear wavy boundary.

Cg2—38 to 48 inches; grayish brown (10YR 5/2) sand; common medium distinct yellowish brown (10YR 5/4) mottles; single grained; loose; 2 percent gravel; strong effervescence; moderately alkaline; clear smooth boundary.

2Cg3—48 to 60 inches; grayish brown (10YR 5/2) gravelly sand; common medium distinct yellowish brown (10YR 5/4) mottles; single grained; loose; 30 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 30 to 50 inches.

The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is fine sandy loam or loam.

The Bg horizon has hue of 10YR or 2.5Y, value of 3 to 6, and chroma of 1 or 2. It is sandy loam, fine sandy loam, or loam. Reaction ranges from slightly acid to moderately alkaline.

The Cg and 2Cg horizons have hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. The 2Cg horizon is the gravelly or very gravelly analogs of loamy sand, sand, or coarse sand.

Coloma Series

The Coloma series consists of very deep, somewhat excessively drained, rapidly permeable soils on terraces

and outwash plains. These soils formed in sandy sediments. Slopes range from 6 to 15 percent.

Coloma soils are similar to Oakville, Sparta, and Spinks soils and are commonly adjacent to Elston soils and to the Billett soils that have a gravelly substratum. Oakville soils do not have bands in the subsoil and have finer sized sand than the Coloma soils. Sparta soils have a thicker and darker surface layer than the Coloma soils. Spinks soils have more than 6 inches of bands in the subsoil. Billett and Elston soils have more clay in the upper part of the subsoil than the Coloma soils. They are at the lower elevations.

Typical pedon of Coloma sand, 6 to 15 percent slopes, in an idle field; 550 feet west and 700 feet south of the center of sec. 26, T. 23 N., R. 5 W.

Ap—0 to 8 inches; dark brown (10YR 3/3) sand, pale brown (10YR 6/3) dry; weak very fine granular structure; very friable; common very fine roots; strongly acid; abrupt smooth boundary.

E—8 to 34 inches; yellowish brown (10YR 5/4) sand; weak coarse subangular blocky structure; very friable; few fine roots; medium acid; gradual wavy boundary.

E&Bt—34 to 80 inches; yellowish brown (10YR 5/4) sand (E); single grained; loose; bands of dark brown (7.5YR 4/4) loamy sand (B) at depths of 33, 37, 41, 45, 49, 52, 55, 59, 63, 67, 71, 75, and 79 inches; massive; very friable; bands are 1/8 to 3/8 inch thick, are discontinuous, and have a cumulative thickness of 3 inches within a depth of 60 inches; weak clay bridges connect sand grains in bands; medium acid.

The thickness of the solum is more than 80 inches. The total thickness of the Bt bands is less than 6 inches within a depth of 59 inches.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3.

The E horizon has hue of 10YR, value of 5, and chroma of 4 to 6. Reaction ranges from very strongly acid to slightly acid.

The E part of the E&Bt horizon has hue of 10YR, value of 5, and chroma of 4 to 6. The Bt part has hue of 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is loamy sand or sandy loam. The E&Bt horizon ranges from very strongly acid to medium acid.

Crosby Series

The Crosby series consists of somewhat poorly drained, slowly permeable soils on till plains and recessional moraines. These soils are moderately deep over compact glacial till. They formed in a thin layer of silty material and in the underlying glacial till. Slopes range from 0 to 6 percent.

The Crosby soils in this survey area have less clay in the subsoil than is defined as the range for the series. This difference, however, does not affect the use or behavior of these soils. The soils are classified as fine-loamy, mixed, mesic Aeric Ochraqualfs.

Crosby soils are commonly adjacent to Fincastle, Mahalasville, Miami, Starks, and Treaty soils. Fincastle and Starks soils have less sand in the upper part of the subsoil than the Crosby soils and have a thicker solum. They are in the more level areas. Mahalasville and Treaty soils have a darker surface layer than the Crosby soils and have a grayer subsoil. They are in depressions. Miami soils have a browner subsoil than the Crosby soils. They are on knolls and on the more sloping part of the side slopes.

Typical pedon of Crosby silt loam, in an area of Crosby-Miami complex, 2 to 6 percent slopes, eroded, in a cultivated field; 530 feet west and 1,450 feet north of the southeast corner of sec. 14, T. 22 N., R. 3 W.

Ap—0 to 9 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; mixed with common medium distinct dark yellowish brown (10YR 4/4) pockets of silty clay loam from the subsoil; moderate medium granular structure; friable; neutral; abrupt smooth boundary.

Bt1—9 to 18 inches; dark yellowish brown (10YR 4/4) silty clay loam; common medium distinct grayish brown (10YR 5/2) mottles; moderate fine subangular blocky structure; firm; common very fine pores; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; slightly acid; clear smooth boundary.

2Bt2—18 to 22 inches; dark yellowish brown (10YR 4/6) clay loam; common medium prominent grayish brown (10YR 5/2) mottles; moderate coarse subangular blocky structure; firm; common very fine pores; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; 5 percent gravel; neutral; clear smooth boundary.

2Bt3—22 to 31 inches; yellowish brown (10YR 5/4) loam; common medium distinct grayish brown (10YR 5/2) and dark yellowish brown (10YR 4/6) mottles; moderate coarse subangular blocky structure; firm; few very fine pores; thin discontinuous dark gray (10YR 4/1) clay films on faces of peds; 5 percent gravel; neutral; gradual wavy boundary.

2Cd—31 to 60 inches; yellowish brown (10YR 5/4) loam; common medium distinct light brownish gray (10YR 6/2) mottles; weak medium and thick platy till

structure; very firm; 5 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 26 to 40 inches. The thickness of the silty material ranges from 0 to 18 inches.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 or 3.

The Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 6. Reaction ranges from strongly acid to neutral.

The 2Bt horizon has hue of 2.5Y or 10YR, value of 5, and chroma of 3 to 6. Reaction ranges from strongly acid to neutral. Some pedons have a BC horizon.

The 2Cd horizon has hue of 10YR, value of 5, and chroma of 3 or 4.

Desker Series

The Desker series consists of well drained soils on kames, eskers, terraces, and outwash plains. These soils are moderately deep over sand and gravelly coarse sand or very gravelly coarse sand. Permeability is moderately rapid in the upper part of the solum, rapid in the lower part of the solum, and very rapid in the underlying material. The soils formed in gravelly outwash. Slopes range from 6 to 18 percent.

Desker soils are similar to Kosciusko soils and are commonly adjacent to Carmi, Longlois, and Rodman soils. Kosciusko soils have more clay in the upper part of the subsoil than the Desker soils and have a lighter colored surface layer. Carmi soils have a dark surface layer that is 10 or more inches thick. They are in the less sloping areas. Longlois soils have more clay in the subsoil than the Desker soils and have a thicker solum. They are in the less sloping areas, on toe slopes, and on ridgetops. Rodman soils have a thinner solum than the Desker soils and have less clay in the subsoil. They are in the steeper areas.

Typical pedon of Desker sandy loam, kame, 6 to 12 percent slopes, eroded, in a cultivated field; 2,480 feet west and 2,270 feet north of the southeast corner of sec. 6, T. 21 N., R. 4 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) sandy loam, dark brown (10YR 4/3) dry; common coarse dark brown (7.5YR 3/4) pockets of material from the subsoil; moderate medium granular structure; friable; slightly acid; 12 percent gravel; abrupt smooth boundary.

Bt1—9 to 15 inches; dark brown (7.5YR 3/4) gravelly sandy loam; moderate fine subangular blocky structure; friable; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; 15 percent gravel; slightly acid; clear smooth boundary.

Bt2—15 to 25 inches; dark brown (7.5YR 3/4) gravelly coarse sandy loam; weak fine subangular blocky structure; friable; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; 18 percent gravel; neutral; clear wavy boundary.

BCt—25 to 34 inches; dark yellowish brown (10YR 4/4) gravelly loamy coarse sand; weak medium granular structure; very friable; thin discontinuous dark brown (7.5YR 3/2) clay films on faces of peds; 20 percent gravel; slight effervescence; moderately alkaline; abrupt irregular boundary.

C—34 to 60 inches; brown (10YR 5/3), stratified sand and gravelly coarse sand; single grained; loose; 25 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 20 to 40 inches.

The Ap horizon has hue of 10YR, value of 3, and chroma of 2 or 3. It is sandy loam or gravelly sandy loam. It is medium acid or slightly acid.

The Bt horizon has hue of 7.5YR and value and chroma of 3 or 4. It is gravelly sandy loam in the upper part and gravelly coarse sandy loam or gravelly loamy coarse sand in the lower part. Reaction ranges from medium acid to neutral in the upper part and from neutral to moderately alkaline in the lower part.

The C horizon has hue of 10YR, value of 5, and chroma of 3 or 4.

Drummer Series

The Drummer series consists of very deep, poorly drained, moderately permeable soils on recessional moraines and till plains. These soils formed in silty sediments and in the underlying glaciofluvial deposits. Slopes range from 0 to 2 percent.

Drummer soils are similar to Mahalasville soils and are commonly adjacent to Brenton, Millbrook, Raub, and Toronto soils. These associated soils are in the higher positions on the landscape. Mahalasville soils formed in less than 40 inches of silty material. Brenton, Raub, Millbrook, and Toronto soils have a browner subsoil than the Drummer soils. Also, Millbrook and Toronto soils have a thinner surface layer.

Typical pedon of Drummer silty clay loam, in an area of Drummer soils, in a cultivated field; 2,540 feet east and 100 feet south of the northwest corner of sec. 6, T. 22 N., R. 3 W.

Ap—0 to 9 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak fine and medium subangular blocky structure; firm; many medium roots; neutral; abrupt smooth boundary.

A—9 to 13 inches; black (10YR 2/1) silty clay loam,

dark gray (10YR 4/1) dry; weak medium prismatic structure parting to weak medium subangular blocky; firm; common medium roots; neutral; clear smooth boundary.

AB—13 to 17 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; common fine prominent light olive brown (2.5Y 5/4) mottles; moderate coarse prismatic structure parting to moderate fine subangular blocky; firm; common fine and medium roots; common fine pores; common fine strong brown (7.5YR 4/6) iron and manganese oxide accumulations; neutral; clear smooth boundary.

Bg1—17 to 23 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine prominent yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; common fine roots; common fine pores; thin continuous very dark gray (10YR 3/1) organic coatings on faces of peds; common fine strong brown (7.5YR 4/6) iron and manganese oxide accumulations; slightly acid; gradual smooth boundary.

Bg2—23 to 30 inches; grayish brown (2.5Y 5/2) silty clay loam; common medium prominent yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate coarse angular blocky; firm; common fine roots; common fine pores; thin continuous very dark gray (10YR 3/1) organic coatings on faces of peds; few fine strong brown (7.5YR 4/6) iron and manganese oxide accumulations; neutral; gradual smooth boundary.

Bg3—30 to 38 inches; light brownish gray (2.5Y 6/2) silty clay loam; many coarse prominent yellowish brown (10YR 5/6) mottles; moderate coarse prismatic structure parting to moderate coarse subangular blocky; firm; few fine roots; common fine pores; thin continuous dark gray (10YR 4/1) clay films on faces of peds; common medium black (5YR 2.5/1) iron and manganese oxide accumulations; neutral; gradual smooth boundary.

Bw1—38 to 54 inches; yellowish brown (10YR 5/6) silt loam; many coarse prominent light brownish gray (2.5Y 6/2) mottles; weak coarse prismatic structure parting to weak coarse subangular blocky; firm; few fine roots; common fine pores; thin discontinuous grayish brown (2.5Y 5/2) clay films on faces of peds; common medium black (5YR 2.5/1) iron and manganese oxide accumulations; neutral; clear wavy boundary.

2Bw2—54 to 70 inches; yellowish brown (10YR 5/6) clay loam; many coarse distinct grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure; firm; thin patchy dark gray (10YR 4/1) clay films on faces of peds; common medium black (5YR 2.5/1) iron and manganese oxide accumulations; 3 percent gravel; neutral; gradual smooth boundary.

2C—70 to 80 inches; yellowish brown (10YR 5/6) loam that has strata of silty clay loam; many coarse distinct grayish brown (10YR 5/2) mottles; massive; firm; few medium black (5YR 2.5/1) iron and manganese oxide accumulations; 5 percent gravel; slight effervescence; mildly alkaline.

The thickness of the solum ranges from 45 to more than 60 inches. The thickness of the silty material ranges from 40 to 60 inches.

The Ap and A horizons have hue of 10YR, value of 2 or 3, and chroma of 1. The total combined thickness of the A horizons ranges from 10 to 20 inches.

The Bg horizon is mottled. It has hue of 5Y, 2.5Y, or 10YR, value of 4 to 6, and chroma of 1 or 2. Reaction ranges from slightly acid to mildly alkaline.

The 2Bw horizon has hue of 5Y, 2.5Y, or 10YR, value of 4 to 6, and chroma of 1 to 6. It is clay loam, sandy clay loam, loam, or sandy loam. Reaction ranges from slightly acid to mildly alkaline.

The 2C horizon has hue of 2.5Y or 10YR, value of 4 to 7, and chroma of 1 to 8. The texture ranges from silty clay loam to sandy loam.

A stratified sandy substratum phase is recognized in the county.

Du Page Series

The Du Page series consists of very deep, well drained, moderately permeable soils on flood plains. These soils formed in loamy alluvium. Slopes range from 0 to 2 percent.

Du Page soils are similar to Ross soils and are commonly adjacent to Allison, Battleground, Sawabash, and Tice soils. Ross soils are not calcareous in the upper part of the solum. Allison soils have less sand in the subsoil than the Du Page soils. They are in the slightly higher positions on the landscape. Battleground soils have a dark surface layer less than 24 inches thick and have less sand in the subsoil than the Du Page soils. They are at the slightly lower elevations. Sawabash and Tice soils have a grayer subsoil than the Du Page soils and have less sand in the subsoil. They are in the lower lying areas.

Typical pedon of Du Page loam, frequently flooded, in a cultivated field; 395 feet north and 60 feet west of the southeast corner of sec. 26, T. 23 N., R. 6 W.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; common fine

roots; slight effervescence; moderately alkaline; abrupt smooth boundary.

A1—10 to 14 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; moderate medium subangular blocky structure; friable; common very fine roots; common very fine pores; thin continuous black (10YR 2/1) organic coatings on faces of peds; slight effervescence; moderately alkaline; gradual smooth boundary.

A2—14 to 34 inches; very dark gray (10YR 3/1) loam, dark grayish brown (10YR 4/2) dry; moderate very fine subangular blocky structure; friable; few very fine roots; common very fine pores; thin continuous black (10YR 2/1) organic coatings on faces of peds; slight effervescence; moderately alkaline; gradual smooth boundary.

A3—34 to 49 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; moderate very fine subangular blocky structure; friable; common very fine pores; thin continuous black (10YR 2/1) organic coatings on faces of peds; slight effervescence; moderately alkaline; gradual smooth boundary.

C—49 to 60 inches; dark brown (10YR 4/3) sandy loam; moderate fine subangular blocky structure; friable; few very fine pores; slight effervescence; moderately alkaline.

The thickness of the mollic epipedon ranges from 24 to 52 inches.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3.

The C horizon has hue of 10YR, value of 4, and chroma of 3 or 4.

Elston Series

The Elston series consists of well drained soils on terraces and outwash plains. These soils are deep or very deep over gravelly sand or coarse sand and very gravelly coarse sand. Permeability is moderately rapid in the upper part of the solum, rapid in the lower part of the solum, and very rapid in the underlying material. The soils formed in loamy outwash and in the underlying gravelly outwash. Slopes range from 0 to 2 percent.

The Elston soils in this survey area are taxadjuncts because they do not have a sufficient increase in clay content in the subsoil. This difference, however, does not affect the use or behavior of these soils. The soils are classified as coarse-loamy, mixed, mesic Typic Hapludolls.

Elston soils are similar to Carmi soils and to the Billett soils that have a gravelly substratum. They are commonly adjacent to Sparta and Troxel soils. Billett soils have a dark surface layer less than 10 inches thick. Carmi soils have more gravel in the subsoil than the Elston soils. Sparta soils have less clay and gravel throughout the solum than the Elston soils. They are on rises. Troxel soils have less sand in the upper part of the subsoil than the Elston soils and have a thicker surface layer. They are in depressions and drainageways.

Typical pedon of Elston loam, gravelly substratum, 0 to 2 percent slopes, in a cultivated field; 200 feet east and 1,055 feet south of the northwest corner of sec. 7, T. 22 N., R. 5 W.

Ap—0 to 9 inches; very dark brown (10YR 2/2) loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; friable; neutral; abrupt smooth boundary.

A—9 to 14 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; friable; many fine pores; thin continuous black (10YR 2/1) organic coatings on faces of peds; strongly acid; clear smooth boundary.

Bt1—14 to 19 inches; dark yellowish brown (10YR 3/4) loam; moderate fine subangular blocky structure; friable; common fine and medium pores; thin continuous very dark grayish brown (10YR 3/2) clay films on faces of peds; slightly acid; clear smooth boundary.

Bt2—19 to 24 inches; dark brown (7.5YR 3/4) sandy loam; moderate medium subangular blocky structure; friable; many fine and medium pores; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; slightly acid; clear smooth boundary.

Bt3—24 to 29 inches; dark brown (7.5YR 3/4) sandy loam; moderate medium subangular blocky structure; friable; many fine pores; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; slightly acid; clear smooth boundary.

2Bt4—29 to 34 inches; dark brown (7.5YR 3/4) sandy loam; moderate medium subangular blocky structure; friable; many fine pores; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; 3 percent gravel; strongly acid; clear smooth boundary.

2Bt5—34 to 38 inches; dark brown (7.5YR 3/4) sandy loam; weak coarse subangular blocky structure; friable; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; 10 percent gravel; strongly acid; gradual smooth boundary.

2Bt6—38 to 45 inches; dark brown (7.5YR 3/4) loamy sand; weak coarse subangular blocky structure; very friable; thin discontinuous dark brown (7.5YR 3/2) clay films on faces of peds; 1 percent gravel;

strongly acid; clear wavy boundary.

2Bt7—45 to 52 inches; dark brown (7.5YR 3/4) loamy sand; weak coarse subangular blocky structure; very friable; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; 6 percent gravel; medium acid; gradual wavy boundary.

2Bt8—52 to 58 inches; dark brown (7.5YR 3/4) loamy sand; weak coarse subangular blocky structure; very friable; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; 8 percent gravel; slightly acid; clear wavy boundary.

3C—58 to 70 inches; yellowish brown (10YR 5/4) gravelly sand; single grained; loose; 19 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 70 inches.

The Ap horizon has hue of 10YR, value of 3, and chroma of 1 or 2. It is loam or sandy loam. The total combined thickness of the A horizons ranges from 10 to 23 inches.

The Bt horizon has hue of 7.5YR or 10YR and value and chroma of 3 or 4. Reaction ranges from strongly acid to slightly acid.

The 2Bt horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 or 4. It is sand, loamy sand, or sandy loam. The content of gravel ranges from 0 to 14 percent. Reaction ranges from strongly acid to neutral.

The 2C horizon has hue of 10YR, value of 5, and chroma of 3 or 4. It is stratified. The textures include sand, coarse sand, gravelly sand, and very gravelly coarse sand.

Fincastle Series

The Fincastle series consists of somewhat poorly drained soils on till plains. These soils are deep over compact glacial till. Permeability is moderate in the upper part of the solum, moderately slow in the lower part of the solum, and slow in the underlying material. The soils formed in silty material and in the underlying glacial till. Slopes range from 0 to 3 percent.

Fincastle soils are similar to Toronto soils and are adjacent to Crosby, Mahalasville, Miami, Rockfield, Starks, and Treaty soils. Toronto soils have a darker surface layer than the Fincastle soils. Crosby soils have more sand in the upper part of the subsoil than the Fincastle soils. They are in positions on the landscape similar to those of the Fincastle soils. Mahalasville and Treaty soils have a dark surface layer and a gray subsoil. They are in the lower positions on the landscape. Miami soils have a brown subsoil that is not mottled. Also, they have more sand in the upper part of the subsoil than the Fincastle soils. They are on slight rises and in the more sloping areas along drainageways. Rockfield soils do not have gray mottles in the upper part of the subsoil. They are on rises and in the more sloping areas adjacent to drainageways. Starks soils are underlain by stratified material. They are in positions on the landscape similar to those of the Fincastle soils.

Typical pedon of Fincastle silt loam, in an area of Starks-Fincastle complex, 0 to 2 percent slopes, in a cultivated field; 1,060 feet east and 1,060 feet north of the southwest corner of sec. 14, T. 23 N., R. 3 W.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silt loam, pale brown (10YR 6/3) dry; moderate medium and fine granular structure; friable; many fine roots; strongly acid; abrupt smooth boundary.

Bt1—10 to 15 inches; olive brown (2.5Y 4/4) silt loam; common fine prominent grayish brown (10YR 5/2) mottles; moderate fine subangular blocky structure; firm; common fine roots; many fine pores; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; thin discontinuous light brownish gray (10YR 6/2) silt coatings on faces of peds; common fine black (N 2/0) iron and manganese oxide accumulations; very strongly acid; clear smooth boundary.

Bt2—15 to 23 inches; dark yellowish brown (10YR 4/4) silty clay loam; common medium distinct grayish brown (10YR 5/2) mottles; weak medium prismatic structure parting to moderate fine and medium subangular blocky; firm; common fine roots; many fine pores; thin continuous light brownish gray (10YR 6/3) silt coatings on faces of peds; common fine black (N 2/0) iron and manganese oxide accumulations; very strongly acid; clear smooth boundary.

Bt3—23 to 31 inches; yellowish brown (10YR 5/6) silty clay loam; common medium distinct grayish brown (10YR 5/2) and pale brown (10YR 6/3) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; common fine roots; many fine pores; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds and lining pores; thin discontinuous light brownish gray (10YR 6/3) silt coatings on faces of peds; very strongly acid; clear smooth boundary.

Bt4—31 to 39 inches; yellowish brown (10YR 5/6) silty clay loam; common medium distinct grayish brown (10YR 5/2) and pale brown (10YR 6/3) mottles; weak medium prismatic structure parting to weak medium subangular blocky; firm; few fine roots; many fine pores; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds and lining

pores; common fine black (N 2/0) iron and manganese oxide accumulations; medium acid; clear wavy boundary.

2Bt5—39 to 48 inches; yellowish brown (10YR 5/6) clay loam; common medium distinct grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure; firm; few fine roots; many fine pores; thin discontinuous very dark grayish brown (10YR 3/2) clay films on faces of peds; common very dark grayish brown (10YR 3/2) linings in pores; common medium black (N 2/0) iron and manganese oxide accumulations; neutral; clear wavy boundary.

2Bt6—48 to 54 inches; yellowish brown (10YR 5/6) loam; common medium distinct grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure; firm; few fine roots; common fine pores; thin patchy very dark grayish brown (10YR 4/2) clay films and clay flows; few dark grayish brown (10YR 4/2) linings in pores; few medium black (N 2/0) iron and manganese oxide accumulations; mildly alkaline; clear wavy boundary.

2Cd—54 to 60 inches; yellowish brown (10YR 5/4) loam; common coarse distinct gray (10YR 5/1) and many coarse distinct yellowish brown (10YR 5/6) mottles; weak medium platy till structure; very firm; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the silty material ranges from 22 to 40 inches.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3.

The Bt horizon is mottled. It has hue of 2.5Y or 10YR, value of 4 to 6, and chroma of 2 to 6. Reaction ranges from very strongly acid to slightly acid.

The 2Bt horizon is mottled and has colors similar to those of the Bt horizon. Reaction ranges from strongly acid to mildly alkaline.

The 2Cd horizon has hue of 10YR, value of 5, and chroma of 3 to 6.

Harpster Series

The Harpster series consists of very deep, very poorly drained, moderately permeable soils on outwash plains. These soils formed in silty sediments. Slopes range from 0 to 2 percent.

Harpster soils are commonly adjacent to Pella soils and to the Mahalasville soils that have a gravelly substratum. Mahalasville and Pella soils do not have free carbonates in the surface layer or the upper part of the subsoil. They are at the slightly higher elevations.

Typical pedon of Harpster silt loam, pothole, in a cultivated field; 2,240 feet east and 1,580 feet north of the southwest corner of sec. 9, T. 22 N., R. 4 W.

Apk—0 to 11 inches; black (10YR 2/1) silt loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; friable; few snail shells; strong effervescence (17 percent calcium carbonate); moderately alkaline; abrupt smooth boundary.

Bgk—11 to 17 inches; dark gray (5Y 4/1) silt loam; common medium prominent light olive brown (2.5Y 5/6) mottles; weak coarse prismatic structure parting to weak medium platy; friable; common very fine pores; thin discontinuous black (10YR 2/1) organic coatings on faces of peds; krotovina 2 inches in diameter filled with black (10YR 2/1) silty clay loam material; common snail shells; strong effervescence (44 percent calcium carbonate); moderately alkaline; clear smooth boundary.

Bg—17 to 30 inches; dark grayish brown (2.5Y 4/2) silty clay loam; weak coarse subangular blocky structure; firm; few very fine pores; thin discontinuous black (10YR 2/1) organic coatings on faces of peds; many coarse dark reddish brown (2.5YR 3/4) iron and manganese oxide accumulations; krotovina 2 inches in diameter filled with black (10YR 2/1) silty clay loam material; few snail shells; strong effervescence (1 percent calcium carbonate); moderately alkaline; clear smooth boundary.

Cg—30 to 60 inches; gray (5Y 5/1) silt loam; massive; firm; few very fine pores; thin continuous dark gray (10YR 4/1) organic coatings in pores; krotovina 2 inches in diameter filled with black (10YR 2/1) silty clay loam material; few snail shells; strong effervescence (21 percent calcium carbonate); moderately alkaline.

The thickness of the solum ranges from 22 to 40 inches. A calcic horizon is at the surface or within a depth of 16 inches.

The Ap and A horizons have hue of 10YR, value of 2 or 3, and chroma of 1. The total combined thickness of the A horizons ranges from 10 to 24 inches. These horizons are silt loam or silty clay loam.

The Bg horizon has hue of 5Y, 2.5Y, or 10YR, value of 4 to 6, and chroma of 1 or 2.

The Cg horizon has hue of 5Y, 2.5Y, or 10YR, value of 5 or 6, and chroma of 1 or 2.

High Gap Variant

The High Gap Variant consists of moderately well drained soils on uplands. These soils are moderately deep over interbedded siltstone and shale bedrock. Permeability is moderate in the upper part of the solum and moderately slow in the lower part. The soils formed in silty material, loamy glacial drift, and residuum derived from the underlying interbedded siltstone and shale bedrock. Slopes range from 1 to 12 percent.

High Gap Variant soils are commonly adjacent to Berks and Shadeland soils and to the Mahalasville soils that have a shale substratum. Berks soils do not have an argillic horizon. They formed in residuum derived from siltstone bedrock. They are on steep breaks along streams and drainageways. Mahalasville soils have a dark surface layer and a gray subsoil. They are in depressions and drainageways. Shadeland soils have gray mottles in the upper part of the subsoil. They are in the more level areas and in drainageways.

Typical pedon of High Gap Variant silt loam, 1 to 6 percent slopes, eroded, in a cultivated field; 1,400 feet west and 1,600 feet north of the southeast corner of sec. 22, T. 22 N., R. 6 W.

Ap—0 to 9 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; mixed with common coarse dark yellowish brown (10YR 4/4) material from the subsoil; moderate medium granular structure; friable; common very fine roots; 5 percent gravel; slightly acid; abrupt smooth boundary.

Bt1—9 to 15 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine subangular blocky structure; firm; common very fine roots; common very fine pores; thin continuous dark brown (10YR 4/3) clay films on faces of peds; 2 percent gravel; very strongly acid; clear smooth boundary.

2Bt2—15 to 21 inches; dark brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; firm; common very fine roots; common very fine pores; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; 5 percent gravel; very strongly acid; clear smooth boundary.

2Bt3—21 to 28 inches; dark brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; firm; common very fine roots; common very fine pores; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; 12 percent channers; very strongly acid; clear smooth boundary.

3Bt4—28 to 36 inches; dark yellowish brown (10YR 4/4) channery clay loam; common medium distinct grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure; firm; few very fine roots; few very fine pores; thin continuous dark brown (10YR 4/3) clay films on faces of peds; 20 percent channers; very strongly acid; clear wavy boundary.

3Cr—36 to 60 inches; weathered interbedded siltstone and shale.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches. The thickness of the silty material ranges from 0 to 20 inches.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam or loam.

The Bt horizon, if it occurs, has hue of 10YR, value of 4 or 5, and chroma of 4 to 6.

The 2Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. Reaction ranges from very strongly acid to medium acid. The 3Bt horizon ranges from very strongly acid to medium acid.

Hononegah Series

The Hononegah series consists of excessively drained soils on stream terraces. These soils are moderately deep or deep over very gravelly coarse sand. Permeability is rapid in the solum and very rapid in the underlying material. The soils formed in sandy outwash and in the underlying gravelly outwash. Slopes range from 0 to 6 percent.

Hononegah soils are commonly adjacent to Rodman, Sleeth, and Strawn soils and to the Mahalasville soils that have a gravelly substratum. Mahalasville soils have a grayer subsoil than the Hononegah soils. They are in depressional areas. Rodman soils have a dark surface layer less than 10 inches thick and have a solum less than 15 inches thick. Sleeth soils have gray mottles in the upper part of the subsoil. They are in the lower lying areas. Strawn soils have more clay and less sand in the subsoil than the Hononegah soils. They formed in glacial till. Rodman and Strawn soils are on steep breaks of terraces and till plains.

Typical pedon of Hononegah fine sandy loam, 0 to 2 percent slopes (fig. 17), in a cultivated field; 530 feet east and 590 feet north of the southwest corner of sec. 33, T. 23 W., R. 3 W.

Ap—0 to 11 inches; very dark grayish brown (10YR 3/2) fine sandy loam, brown (10YR 4/3) dry; moderate medium granular structure; very friable; many fine and medium roots; 2 percent gravel; medium acid; abrupt smooth boundary.

Bt1—11 to 18 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; very friable; common fine roots; common fine pores; thin continuous very dark grayish brown (10YR 3/2) clay films on faces of peds; 2 percent gravel; medium acid; clear wavy boundary.

Bt2—18 to 23 inches; dark brown (7.5YR 3/4) loamy sand; weak coarse subangular blocky structure; very friable; common fine roots; common fine pores; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; 5 percent gravel; slightly acid; clear wavy boundary.

Bt3—23 to 30 inches; dark brown (7.5YR 4/4) loamy sand; weak coarse subangular blocky structure; very friable; common fine roots; common fine pores;

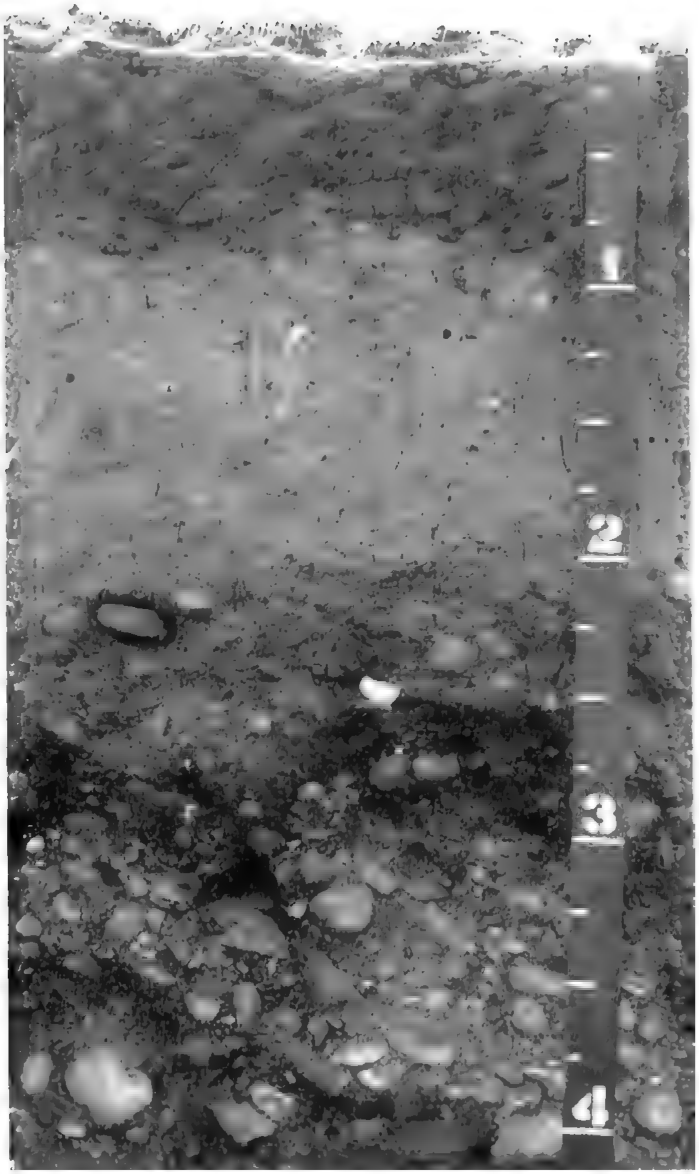

Figure 17.—Profile of Hononegah fine sandy loam, 0 to 2 percent slopes. Sandy outwash is underlain by gravelly outwash at a depth of about 2 feet. Depth is marked in feet.

thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; 8 percent gravel; slightly acid; clear wavy boundary.

2Bt4—30 to 37 inches; dark brown (7.5YR 4/4) gravelly loamy sand; weak coarse subangular blocky structure; very friable; common fine roots; common fine pores; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; 23 percent gravel; neutral; clear wavy boundary.

2Bt5—37 to 45 inches; dark brown (7.5YR 3/4) gravelly sand; weak coarse subangular blocky structure; very friable; common fine roots; common fine pores; thin discontinuous dark brown (7.5YR 3/2) clay films on faces of peds; 19 percent gravel; neutral; clear wavy boundary.

2C—45 to 60 inches; brown (10YR 5/3) very gravelly coarse sand; single grained; loose; 55 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 30 to 50 inches.

The Ap horizon has hue of 10YR, value of 3, and chroma of 1 or 2. It is fine sandy loam or loamy sand.

The Bt horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 4. Reaction ranges from medium acid to mildly alkaline.

The 2Bt horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 4.

The 2C horizon has hue of 10YR, value of 5, and chroma of 3 or 4. It is stratified and commonly is coarse sand, gravelly coarse sand, or very gravelly coarse sand.

Houghton Series

The Houghton series consists of very deep, very poorly drained soils on till plains, recessional moraines, outwash plains, and terraces. Permeability ranges from moderately slow to moderately rapid. The soils formed in organic deposits. Slopes range from 0 to 2 percent.

Houghton soils are similar to Muskego and Palms soils and are commonly adjacent to Drummer, Mahalasville, Pella, and Treaty soils. Muskego soils formed in organic deposits overlying coprogenous earth. Palms soils formed in organic deposits overlying mineral material. Drummer, Mahalasville, Pella, and Treaty soils formed in mineral material. They are in the slightly higher areas.

Typical pedon of Houghton muck, undrained, in a pasture; 460 feet east and 1,320 feet south of the center of sec. 23, T. 24 N., R. 4 W.

Oa1—0 to 6 inches; sapric material, black (10YR 2/1) broken face and rubbed; 5 percent fiber, trace rubbed; moderate medium granular structure; friable; many fine and very fine roots; 10 percent mineral material; mildly alkaline; clear smooth boundary.

Oa2—6 to 25 inches; sapric material, black (10YR 2/1) broken face and rubbed; 5 percent fiber, trace rubbed; moderate medium subangular blocky structure; friable; common fine and very fine roots;

10 percent mineral material; mildly alkaline; clear wavy boundary.

Oa3—25 to 37 inches; sapric material, black (5YR 2.5/1) broken face, black (N 2/0) rubbed; 15 percent fiber, trace rubbed; weak coarse subangular blocky structure; friable; common very fine roots; 1 percent mineral material; mildly alkaline; clear smooth boundary.

Oa4—37 to 60 inches; sapric material, dark reddish brown (5YR 3/3) broken face, dark reddish brown (5YR 2.5/3) rubbed; 25 percent fiber, 10 percent rubbed; massive; friable; 1 percent mineral material; mildly alkaline.

The thickness of the organic material is more than 51 inches. Reaction ranges from slightly acid to mildly alkaline throughout.

The surface tier has hue of 10YR or is neutral in hue. It has value of 2 and chroma of 0 or 1. The mineral content ranges from 5 to 50 percent.

The subsurface and bottom tiers have hue of 5YR, 7.5YR, or 10YR or are neutral in hue. They have value of 2 or 3 and chroma of 0 to 2. They are primarily sapric material, but thin layers of hemic material with a combined thickness of less than 10 inches are in some pedons.

Kalamazoo Series

The Kalamazoo series consists of well drained soils on kames, outwash plains, and stream terraces. These soils are deep or very deep over very gravelly coarse sand and coarse sand. Permeability is moderate in the upper part of the solum, rapid in the lower part of the solum, and very rapid in the underlying material. The soils formed in loamy outwash and in the underlying gravelly outwash. Slopes range from 0 to 12 percent.

Kalamazoo soils are similar to Longlois and Ockley soils and are commonly adjacent to Kosciusko, Rodman, and Thackery soils. Longlois and Ockley soils have more clay in the lower part of the subsoil than the Kalamazoo soils. Kosciusko soils have a solum that is less than 40 inches thick. They are in the more sloping areas. Rodman soils have less clay in the subsoil than the Kalamazoo soils and have a thinner solum. They are in steep areas along terrace breaks and streams. Thackery soils have gray mottles in the lower part of the subsoil. They are in the lower lying areas.

Typical pedon of Kalamazoo loam, 0 to 2 percent slopes, in a cultivated field; 2,740 feet west and 200 feet south of the northeast corner of sec. 17, T. 24 N., R. 3 W.

Ap—0 to 11 inches; brown (10YR 4/3) loam, pale brown (10YR 6/3) dry; weak medium granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

Bt1—11 to 15 inches; brown (7.5YR 4/4) loam; moderate fine subangular blocky structure; firm; common very fine roots; common very fine pores; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; neutral; clear smooth boundary.

Bt2—15 to 24 inches; brown (7.5YR 4/4) loam; moderate medium subangular blocky structure; firm; common very fine roots; common very fine pores; thin continuous brown (7.5YR 4/4) clay films on faces of peds; slightly acid; clear smooth boundary.

Bt3—24 to 29 inches; brown (7.5YR 4/4) loam; moderate medium subangular blocky structure; firm; common very fine roots; common very fine pores; thin continuous brown (7.5YR 4/4) clay films on faces of peds; 5 percent gravel; medium acid; clear smooth boundary.

2Bt4—29 to 34 inches; brown (7.5YR 4/4) sandy clay loam; weak medium subangular blocky structure; firm; common very fine pores; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; 10 percent gravel; medium acid; clear smooth boundary.

2BCt—34 to 61 inches; dark brown (7.5YR 3/2) loamy coarse sand; weak coarse subangular blocky structure; friable; thin continuous dark brown (7.5YR 3/2) clay bridges between sand grains; 12 percent gravel; slightly acid; gradual smooth boundary.

3C—61 to 70 inches; yellowish brown (10YR 5/4), stratified very gravelly coarse sand and coarse sand; single grained; loose; 50 percent gravel; strong effervescence; mildly alkaline.

The thickness of the solum ranges from 40 to 80 inches.

The Ap horizon has hue of 10YR, value of 4, and chroma of 3. It is loam or silt loam.

The Bt horizon has hue of 7.5YR or 10YR and value and chroma of 4. It is silty clay loam, clay loam, or loam. Reaction ranges from strongly acid to neutral.

The 2Bt horizon has hue of 5YR to 10YR, value of 4, and chroma of 2 to 4. It is sandy clay loam or sandy loam or the gravelly analogs of these textures. Reaction ranges from strongly acid to mildly alkaline.

The 2BCt horizon has colors similar to those of the 2Bt horizon. It is loamy coarse sand or loamy sand or the gravelly analogs of these textures.

The 3C horizon has hue of 10YR, value of 5, and chroma of 3 or 4. It is stratified and commonly is coarse sand and sand or the very gravelly and gravelly analogs of these textures.

A kame phase is recognized in the county.

Kosciusko Series

The Kosciusko series consists of well drained soils on eskers, kames, terraces, and outwash plains. These soils are moderately deep over sand and very gravelly sand. Permeability is moderate in the solum and very rapid in the underlying material. The soils formed in gravelly outwash. Slopes range from 6 to 18 percent.

Kosciusko soils are similar to Desker soils and are commonly adjacent to Kalamazoo soils. Desker soils have a darker surface layer than the Kosciusko soils and have less clay in the upper part of the subsoil. Kalamazoo soils have a thicker solum than the Kosciusko soils. They are in the more level areas and on toe slopes.

Typical pedon of Kosciusko gravelly sandy clay loam, 6 to 12 percent slopes, severely eroded, in a cultivated field; 1,730 feet east and 680 feet south of the northwest corner of sec. 27, T. 22 N., R. 4 W.

Ap—0 to 8 inches; brown (10YR 4/3) gravelly sandy clay loam, pale brown (10YR 6/3) dry; weak fine subangular blocky structure; firm; common fine roots; 15 percent gravel; slightly acid; abrupt smooth boundary.

Bt1—8 to 14 inches; dark brown (7.5YR 4/4) gravelly sandy clay loam; moderate medium subangular blocky structure; firm; common fine roots; common very fine pores; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; 15 percent gravel; slightly acid; clear smooth boundary.

Bt2—14 to 20 inches; dark brown (7.5YR 3/4) gravelly sandy clay loam; moderate medium subangular blocky structure; firm; common fine roots; common very fine pores; common thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; 22 percent gravel; mildly alkaline; clear wavy boundary.

BCt—20 to 27 inches; dark brown (7.5YR 3/4) gravelly sandy loam; weak medium subangular blocky structure; firm; few fine roots; common very fine pores; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; 32 percent gravel; slight effervescence; mildly alkaline; clear irregular boundary.

C—27 to 60 inches; yellowish brown (10YR 5/4), stratified sand and very gravelly sand; single grained; loose; 40 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 24 to 40 inches.

The Ap horizon has hue of 10YR, value of 4, and chroma of 3 or 4. Pedons in noncultivated areas have an A horizon. This horizon has hue of 10YR, value of 3, and chroma of 1 or 2. It is sandy loam, gravelly sandy clay loam, or loam.

The Bt horizon has hue of 10YR or 7.5YR and value and chroma of 3 or 4. It is gravelly clay loam, gravelly sandy clay loam, or very gravelly sandy loam. Reaction ranges from strongly acid to mildly alkaline.

The BCt horizon is gravelly sandy loam or very gravelly sandy loam.

The C horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4.

Lafayette Series

The Lafayette series consists of somewhat poorly drained soils on outwash plains. These soils are deep or very deep over gravelly coarse sand. Permeability is moderate in the solum and very rapid in the underlying material. The soils formed in silty and loamy sediments and in the underlying gravelly outwash. Slopes range from 0 to 2 percent.

The Lafayette soils in this survey area have more clay in the upper part of the subsoil than is defined as the range for the series. This difference, however, does not affect the use or behavior of these soils. The soils are classified as fine, mixed, mesic Aquic Argiudolls.

Lafayette soils are similar to Mulvey soils and are commonly adjacent to Bowes, Bowes Variant, and Waupecan soils and to the Mahalasville soils that have a gravelly substratum. Mulvey soils have a dark surface layer less than 10 inches thick. Bowes, Bowes Variant, and Waupecan soils have a browner subsoil than the Lafayette soils. They are in the slightly higher positions on the landscape. Mahalasville soils have a grayer subsoil than the Lafayette soils. They are at the slightly lower elevations and in depressions.

Typical pedon of Lafayette silt loam, 0 to 2 percent slopes, in a cultivated field; 1,750 feet west and 260 feet north of the southeast corner of sec. 13, T. 22 N., R. 4 W.

Ap—0 to 10 inches; very dark gray (10YR 3/1) silt loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; friable; medium acid; abrupt smooth boundary.

A—10 to 13 inches; very dark gray (10YR 3/1) silt loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; friable; few fine pores; medium acid; clear wavy boundary.

BA—13 to 19 inches; brown (10YR 5/3) silt loam; few fine faint dark grayish brown (10YR 4/2) mottles; weak fine and medium subangular blocky structure; firm; common fine pores; thin patchy dark gray (10YR 4/1) clay films and very dark gray (10YR 3/1) organic coatings on faces of peds; strongly acid; gradual wavy boundary.

Bt1—19 to 28 inches; dark yellowish brown (10YR 4/4) silty clay loam; common medium distinct dark grayish brown (10YR 4/2) mottles; moderate medium subangular blocky structure; firm; common fine pores; thin continuous dark grayish brown (2.5YR 4/2) clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt2—28 to 40 inches; yellowish brown (10YR 5/6) silty clay loam; common medium distinct grayish brown (10YR 5/2) mottles; moderate medium prismatic structure parting to moderate medium blocky; firm; common fine pores; thin continuous dark grayish brown (2.5Y 4/2) clay films on faces of peds and lining pores; strongly acid; clear smooth boundary.

2Btg1—40 to 45 inches; grayish brown (10YR 5/2) sandy loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few fine pores; thin discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; 13 percent fine gravel; strongly acid; clear wavy boundary.

2Btg2—45 to 50 inches; dark grayish brown (10YR 4/2) loamy coarse sand that has pockets of sandy loam; common medium distinct dark yellowish brown (10YR 4/6) mottles; weak coarse subangular blocky structure; friable; thin discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; 9 percent fine gravel; strongly acid; clear wavy boundary.

3Btg3—50 to 65 inches; dark grayish brown (10YR 4/2) gravelly sandy loam; common fine distinct dark yellowish brown (10YR 4/6) mottles; weak fine and medium subangular blocky structure; firm; thin continuous very dark gray (N 3/0) clay films on faces of peds; 22 percent fine gravel; slightly acid; clear wavy boundary.

3C—65 to 70 inches; brown (10YR 5/3) gravelly coarse sand; single grained; loose; 24 percent gravel; strong effervescence; mildly alkaline.

The thickness of the solum ranges from 55 to 70 inches. The thickness of the silty material ranges from 24 to 40 inches.

The Ap horizon has hue of 10YR, value of 3, and chroma of 1 or 2.

The Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 6. It is silty clay loam or silt loam. Reaction ranges from strongly acid to slightly acid.

The 2Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. It is clay loam, sandy clay loam, sandy loam, or loamy coarse sand. Reaction ranges from strongly acid to slightly acid.

The 3Btg horizon ranges from slightly acid to neutral.

La Hogue Series

The La Hogue series consists of somewhat poorly drained soils on till plains. These soils are deep over compact glacial till. Permeability is moderate in the solum and slow in the underlying material. The soils formed in glaciofluvial deposits and in the underlying glacial till. Slopes range from 0 to 2 percent.

La Hogue soils are commonly adjacent to Drummer, Linkville, and Oakville soils and to the Billett soils that are moderately wet. Billett soils have a dark surface layer less than 10 inches thick and do not have gray mottles in the upper part of the subsoil. They are in the slightly higher areas. Drummer soils have a grayer subsoil than the La Hogue soils and have less clay in the subsoil. Linkville and Oakville soils have a dominantly brown subsoil. They are on rises and in the more sloping areas along drainageways.

Typical pedon of La Hogue loam, till substratum, 0 to 2 percent slopes, in a cultivated field; 2,080 feet west and 2,490 feet north of the southeast corner of sec. 15, T. 22 N., R. 5 W.

Ap -0 to 10 inches; very dark gray (10YR 3/1) loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; friable; many fine and medium roots; medium acid; abrupt smooth boundary.

BA -10 to 13 inches; dark brown (10YR 4/3) loam; common fine faint dark grayish brown (10YR 4/2) mottles; weak fine subangular blocky structure; friable; common very fine roots; many very fine pores; thin continuous very dark gray (10YR 3/1) organic coatings on faces of peds; strongly acid; clear smooth boundary.

Bt1—13 to 22 inches; dark brown (10YR 4/3) clay loam; common medium faint dark grayish brown (10YR 4/2) mottles; moderate medium subangular blocky structure; firm; common very fine roots; common very fine pores; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; thin discontinuous very dark gray (10YR 3/1) organic coatings on faces of peds; strongly acid; clear smooth boundary.

Bt2—22 to 26 inches; dark brown (10YR 4/3) clay loam; common medium faint dark grayish brown (10YR 4/2) and prominent yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; firm; few very fine roots; common very fine pores; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; 2 percent gravel; strongly acid; clear smooth boundary.

Btg1—26 to 34 inches; dark grayish brown (10YR 4/2) clay loam; many coarse prominent yellowish brown

(10YR 5/8) mottles; moderate coarse subangular blocky structure; firm; few very fine roots; common very fine pores; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; 2 percent gravel; medium acid; clear smooth boundary.

Btg2—34 to 42 inches; dark grayish brown (10YR 4/2) clay loam; many coarse prominent yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; firm; few very fine roots; common very fine pores; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; 5 percent gravel; neutral; clear smooth boundary.

BCt—42 to 47 inches; brown (10YR 5/3) sandy loam that has strata of loamy sand 2 inches thick; common medium faint grayish brown (10YR 5/2) mottles; weak fine subangular blocky structure; friable; few very fine roots; common very fine pores; thin discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; 7 percent gravel; slight effervescence; mildly alkaline; clear wavy boundary.

2Cd—47 to 60 inches; yellowish brown (10YR 5/4) loam; moderate medium platy till structure; very firm; 2 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the glaciofluvial material ranges from 40 to 60 inches.

The Ap horizon has hue of 10YR, value of 3, and chroma of 1 or 2.

The Bt horizon is mottled. It has hue of 10YR, value of 4 or 5, and chroma of 2 to 6.

The 2BC horizon has hue of 2.5Y or 10YR, value of 5, and chroma of 3 or 4. Reaction ranges from slightly acid to mildly alkaline.

Lash Series

The Lash series consists of very deep, well drained soils on flood plains. These soils formed in alluvium. Permeability is moderately rapid in the solum and rapid in the underlying material. Slopes range from 0 to 2 percent.

Lash soils are commonly adjacent to Battleground soils and to the Ouiatenon soils that have a sandy substratum. Battleground soils have more clay and less sand in the subsoil than the Lash soils. Also, they are in areas farther away from stream channels adjacent to uplands. Ouiatenon soils have more sand and less clay in the subsoil than the Lash soils. They are in the higher areas adjacent to stream channels.

Typical pedon of Lash silt loam, frequently flooded, in a cultivated field; 630 feet west and 1,500 feet south of the northeast corner of sec. 25, T. 23 N., R. 6 W.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; many very fine roots; strong effervescence; moderately alkaline; abrupt smooth boundary.

A—10 to 14 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine subangular blocky structure; friable; common very fine roots; many very fine pores; about 30 percent fine and medium sand; strong effervescence; moderately alkaline; clear smooth boundary.

Bw1—14 to 31 inches; dark brown (10YR 4/3) silt loam; weak fine subangular blocky structure; friable; few very fine roots; many very fine pores; thin continuous very dark grayish brown (10YR 3/2) organic coatings on faces of peds; about 35 percent fine and medium sand; strong effervescence; moderately alkaline; gradual smooth boundary.

Bw2—31 to 52 inches; dark brown (10YR 4/3) loam; weak fine subangular blocky structure; friable; many very fine pores; thin discontinuous dark brown (10YR 3/2) organic coatings on faces of peds; strong effervescence; moderately alkaline; gradual smooth boundary.

C—52 to 60 inches; dark brown (10YR 4/3) loamy sand; single grained; very friable; common very fine pores; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 60 inches.

The thickness of the A horizon ranges from 10 to 23 inches.

The Bw horizon has hue of 10YR, value of 4, and chroma of 3 or 4. It is silt loam, loam, or fine sandy loam.

The C horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is loamy sand or sand.

Lauramie Series

The Lauramie series consists of very deep, well drained, moderately permeable soils on till plains and recessional moraines. These soils formed in a thin layer of silty material and in the underlying glaciofluvial material and glacial till. Slopes range from 0 to 6 percent.

Lauramie soils are similar to Linkville and Richardville soils and are commonly adjacent to Mellott, Octagon, and Tecumseh soils. Linkville soils have a dark surface layer 10 or more inches thick. Richardville soils have a lighter colored surface layer than the Lauramie soils. Mellott and Tecumseh soils have less sand in the upper part of the subsoil than the Lauramie soils. They are in the more level areas at the slightly higher elevations.

Octagon soils formed in compact glacial till and have a solum less than 40 inches thick. They are in the more sloping areas.

Typical pedon of Lauramie silt loam, 2 to 6 percent slopes, eroded, in a cultivated field; 300 feet west and 400 feet north of the southeast corner of sec. 26, T. 22 N., R. 4 W.

Ap—0 to 9 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; common coarse dark brown (10YR 4/3) pockets of silty clay loam material from the subsoil; moderate medium granular structure; friable; many fine roots; neutral; abrupt smooth boundary.

Bt1—9 to 15 inches; dark brown (10YR 4/3) silty clay loam; moderate fine subangular blocky structure; firm; common very fine roots; common very fine pores; thin continuous very dark grayish brown (10YR 3/2) clay films on faces of peds; medium acid; clear smooth boundary.

2Bt2—15 to 35 inches; dark brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; firm; common very fine roots; common very fine pores; thin continuous very dark grayish brown (10YR 3/2) clay films on faces of peds; 4 percent gravel; slightly acid; clear smooth boundary.

2Bt3—35 to 44 inches; dark brown (7.5YR 4/4) clay loam; moderate coarse subangular blocky structure; firm; common very fine pores; thin discontinuous dark brown (7.5YR 3/2) clay films on faces of peds and in pores; 5 percent gravel; neutral; clear wavy boundary.

3BCt—44 to 50 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak coarse subangular blocky structure; firm; few very fine pores; thin discontinuous dark brown (7.5YR 3/2) clay films on faces of peds and in pores; 8 percent gravel; slight effervescence; mildly alkaline; clear wavy boundary.

3C—50 to 60 inches; yellowish brown (10YR 5/4) fine sandy loam; moderate medium platy till structure; friable; 8 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 70 inches. The thickness of the silty material ranges from 0 to 20 inches.

The Ap horizon has hue of 10YR, value of 3, and chroma of 2 or 3.

The Bt horizon has hue of 10YR, value of 4, and chroma of 3 or 4. It is silt loam or silty clay loam. Reaction ranges from strongly acid to medium acid.

The 2Bt horizon has hue of 7.5YR, value of 4, and chroma of 4 to 6. It is sandy clay loam, clay loam, loam, or fine sandy loam. Reaction ranges from strongly acid to neutral.

The 3BCt horizon is neutral or mildly alkaline.

Linkville Series

The Linkville series consists of very deep, well drained, moderately permeable soils on till plains and recessional moraines. These soils formed in a thin layer of glaciofluvial material and in the underlying glacial till. Slopes range from 0 to 6 percent.

Linkville soils are similar to Lauramie soils and are commonly adjacent to Spinks soils. Lauramie soils have a dark surface layer less than 10 inches thick. Spinks soils have less clay and more sand in the upper part of the subsoil than the Linkville soils. Also, they have a lighter colored surface layer. They are on rises.

Typical pedon of Linkville loam, loamy substratum, 0 to 2 percent slopes, in a cultivated field; 1,320 feet west and 2,420 feet north of the southeast corner of sec. 15, T. 22 N., R. 5 W.

Ap—0 to 10 inches; very dark gray (10YR 3/1) loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; friable; common very fine roots; medium acid; abrupt smooth boundary.

A—10 to 15 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; moderate fine subangular blocky structure; friable; common very fine roots; few very fine pores; thin continuous very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; gradual smooth boundary.

Bt1—15 to 22 inches; dark brown (10YR 4/3) loam; moderate fine subangular blocky structure; friable; common very fine roots; common very fine pores; thin continuous very dark grayish brown (10YR 3/2) clay films on faces of peds; slightly acid; clear smooth boundary.

Bt2—22 to 29 inches; brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; firm; common very fine roots; common very fine pores; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt3—29 to 38 inches; brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; firm; few very fine roots; common very fine pores; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; 5 percent gravel; very strongly acid; clear smooth boundary.

2Bt4—38 to 55 inches; dark yellowish brown (10YR 4/4) clay loam; moderate fine subangular blocky structure; firm; few very fine roots; common very fine pores; thin continuous brown (7.5YR 4/4) clay films on faces of peds; 5 percent gravel; very strongly acid; gradual smooth boundary.

2Bt5—55 to 64 inches; dark yellowish brown (10YR 4/4)

loam; moderate fine subangular blocky structure; firm; common very fine pores; thin continuous brown (7.5YR 4/4) clay films on faces of peds; 5 percent gravel; strongly acid; clear wavy boundary.

2BCt—64 to 70 inches; brown (10YR 5/3) loam; weak medium subangular blocky structure; firm; few very fine pores; thin discontinuous dark brown (7.5YR 4/4) clay films on faces of peds; 5 percent gravel; slight effervescence; mildly alkaline; clear wavy boundary.

2C—70 to 80 inches; brown (10YR 5/3) loam; moderate medium platy till structure; friable; 5 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 50 to 80 inches.

The Ap and A horizons have hue of 10YR, value of 3, and chroma of 1 or 2.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4.

The 2Bt horizon has colors similar to those of the Bt horizon. Reaction ranges from very strongly acid to mildly alkaline.

The 2BC and 2C horizons have hue of 10YR, value of 5, and chroma of 3 or 4.

Longlois Series

The Longlois series consists of well drained soils on eskers, kames, and outwash plains. These soils are deep over gravelly loamy coarse sand and sand or gravelly coarse sand. Permeability is moderate in the solum and very rapid in the underlying material. The soils formed in a thin layer of silty material, in loamy material, and in the underlying gravelly outwash. Slopes range from 2 to 6 percent.

Longlois soils are similar to Kalamazoo and Ockley soils and are commonly adjacent to Bowes, Desker, and Waupecan soils. Kalamazoo and Ockley soils have a lighter colored surface layer than the Longlois soils. Also, Kalamazoo soils have less clay in the lower part of the subsoil. Bowes and Waupecan soils have less sand in the upper part of the subsoil than the Longlois soils. They are in the more level, higher lying areas. Desker soils have less clay in the subsoil than the Longlois soils and have a solum that is less than 40 inches thick. They are in the more sloping areas.

Typical pedon of Longlois silt loam, 2 to 6 percent slopes, eroded, in a cultivated field; 1,640 feet west and 1,960 feet north of the southeast corner of sec. 18, T. 22 N., R. 4 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; common coarse dark brown (7.5YR 3/4) pockets of silty clay loam material from the subsoil; moderate medium granular structure; friable; many fine roots; strongly acid; abrupt smooth boundary.

Bt1—9 to 16 inches; dark brown (7.5YR 3/4) silty clay loam; moderate medium subangular blocky structure; firm; common very fine roots; many very fine pores; thin continuous dark brown (10YR 3/3) clay films on faces of peds; strongly acid; clear smooth boundary.

2Bt2—16 to 20 inches; dark brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; firm; common very fine roots; common very fine pores; thin continuous dark brown (7.5YR 3/4) clay films on faces of peds; 2 percent gravel; strongly acid; clear smooth boundary.

2Bt3—20 to 25 inches; dark brown (7.5YR 4/4) sandy clay loam; moderate medium subangular blocky structure; firm; common very fine roots; many very fine pores; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; 10 percent gravel; strongly acid; clear smooth boundary.

3Bt4—25 to 35 inches; dark brown (7.5YR 4/4) gravelly sandy clay loam; weak medium subangular blocky structure; firm; few very fine roots; common very fine pores; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; 20 percent gravel; strongly acid; gradual smooth boundary.

3Bt5—35 to 43 inches; dark brown (7.5YR 3/2) very gravelly sandy clay loam; weak fine subangular blocky structure; firm; few very fine roots; common very fine pores; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; 41 percent gravel; strongly acid; gradual smooth boundary.

3BCt—43 to 54 inches; dark brown (7.5YR 3/2) very gravelly sandy clay loam; weak fine subangular blocky structure; firm; few very fine roots; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; 40 percent gravel; slight effervescence; mildly alkaline; gradual wavy boundary.

3C—54 to 60 inches; yellowish brown (10YR 5/4) gravelly loamy coarse sand that has strata of sand; single grained; loose; 20 percent gravel; strong effervescence; mildly alkaline.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the silty material ranges from 0 to 20 inches.

The Ap horizon has hue of 10YR, value of 3, and chroma of 2 or 3.

The Bt horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 4 to 6. It is strongly acid or medium acid.

The 2Bt horizon has hue of 7.5YR or 10YR, value of

3 or 4, and chroma of 3 to 6. It is strongly acid or medium acid.

The 3BCt horizon has hue of 7.5YR, value of 3 to 5, and chroma of 3 to 6.

The 3C horizon has hue of 10YR, value of 4 or 5, and chroma of 4. It is stratified. Textures include sand, gravelly loamy coarse sand, gravelly coarse sand, and very gravelly coarse sand.

A kame phase is recognized in the county.

Mahalasville Series

The Mahalasville series consists of very deep, very poorly drained, moderately permeable soils on terraces, outwash plains, till plains, and recessional moraines. These soils formed in silty sediments and in the underlying glaciofluvial deposits. The gravelly substratum phase is deep over very gravelly loamy sand and gravelly sand. The shale substratum phase is deep over shale bedrock. Permeability is moderate in the solum of the gravelly substratum phase and very rapid in the substratum. It is moderate in the upper part of the solum in the shale substratum phase and moderately rapid in the lower part. Slopes range from 0 to 2 percent.

Mahalasville soils are similar to Drummer soils and are commonly adjacent to Fincastle, High Gap Variant, Lafayette, Shadeland, Starks, Treaty, and Waupecan soils. Drummer soils do not have an argillic horizon. They formed in more than 40 inches of silty sediments. Fincastle, Lafayette, Shadeland, and Starks soils have a browner subsoil than the Mahalasville soils. They are in the slightly higher positions on the landscape. High Gap Variant soils do not have gray mottles in the upper part of the subsoil. They are in the slightly higher lying areas. Treaty soils formed in silty material and in the underlying glacial till. They are in positions on the landscape similar to those of the Mahalasville soils. Waupecan soils do not have gray mottles in the upper part of the subsoil. They are in the higher positions on the landscape.

Typical pedon of Mahalasville silty clay loam, in an area of Mahalasville-Treaty complex, in a cultivated field; 2,200 feet east and 1,100 feet south of the northwest corner of sec. 24, T. 22 N., R. 3 W.

Ap—0 to 12 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate medium granular structure; firm; many fine roots; neutral; abrupt smooth boundary.

Btg1—12 to 17 inches; dark gray (10YR 4/1) silty clay loam; common medium distinct olive brown (2.5Y 4/2) mottles; moderate fine subangular blocky structure; firm; thin continuous dark gray (10YR 4/1) clay films and black (10YR 2/1) organic coatings on faces of peds; common very fine roots; common very fine pores; neutral; clear smooth boundary.

Btg2—17 to 25 inches; grayish brown (2.5Y 5/2) silty clay loam; common medium distinct light olive brown (2.5Y 5/6) mottles; moderate medium subangular blocky structure; firm; common very fine roots; common very fine pores; thin continuous gray (10YR 5/1) clay films and patchy black (10YR 2/1) organic coatings on faces of peds; neutral; clear smooth boundary.

Btg3—25 to 38 inches; grayish brown (2.5Y 5/2) silty clay loam; common medium distinct light olive brown (2.5Y 5/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; few very fine roots; common very fine pores; thin continuous gray (10YR 5/1) clay films on faces of peds; thin continuous black (10YR 2/1) organic coatings in pores; few very fine roots; common very fine pores; neutral; clear smooth boundary.

2Btg4—38 to 48 inches; grayish brown (2.5Y 5/2) loam that has strata of silt loam; common medium distinct light olive brown (2.5Y 5/6) mottles; weak coarse subangular blocky structure; firm; common very fine pores; thin discontinuous gray (10YR 5/1) clay films on faces of peds; thin continuous black (10YR 2/1) organic coatings in pores; mildly alkaline; gradual wavy boundary.

3C—48 to 60 inches; light olive brown (2.5Y 5/4) loamy sand that has strata of fine sandy loam; single grained; loose; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the silty material ranges from 24 to 40 inches.

The Ap and A horizons have hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The total combined thickness of the A horizons ranges from 10 to 21 inches.

The Btg horizon is mottled. It has hue of 2.5Y or 10YR, value of 4 to 6, and chroma of 1 or 2.

The 2Btg horizon is mottled. It has colors similar to those of the Btg horizon. It is clay loam, sandy clay loam, loamy coarse sand, loam, sandy loam, or silt loam.

The 2Cg horizon has hue of 2.5Y or 10YR, value of 5 or 6, and chroma of 1 or 2. Textures range from silt loam to sandy loam. This horizon has sandy strata in all pedons.

Marker Series

The Marker series consists of moderately well drained soils on recessional moraines. These soils are

moderately deep over compact glacial till. Permeability is moderate in the solum and slow in the underlying material. The soils formed in silty glacial till. Slopes range from 2 to 6 percent.

Marker soils are commonly adjacent to Beecher and Drummer soils. Beecher soils have gray mottles immediately below the surface layer. They are in the more level areas. Drummer soils have a dominantly gray subsoil. They are in depressions and drainageways.

Typical pedon of Marker silt loam, 2 to 6 percent slopes, eroded, in a cultivated field; 330 feet east and 2,500 feet south of the northwest corner of sec. 10, T. 24 N., R. 5 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; common coarse olive brown (2.5Y 4/4) pockets of silty clay loam material from the subsoil; moderate medium granular structure; friable; 3 percent gravel; slightly acid; abrupt smooth boundary.

Bt1—8 to 14 inches; olive brown (2.5Y 4/4) clay loam; moderate fine subangular blocky structure; firm; many very fine and fine pores; thin continuous dark brown (10YR 3/3) clay films on faces of peds; 3 percent gravel; strongly acid; clear smooth boundary.

Bt2—14 to 21 inches; light olive brown (2.5Y 5/6) clay loam; common medium distinct grayish brown (2.5Y 5/2) mottles; moderate coarse prismatic structure parting to moderate coarse subangular blocky; firm; many very fine pores; thin continuous very dark grayish brown (10YR 3/2) clay films on faces of peds; 3 percent gravel; neutral; clear smooth boundary.

2BCt—21 to 26 inches; light olive brown (2.5Y 5/6) silt loam; common medium distinct light brownish gray (2.5Y 6/2) mottles; moderate coarse subangular blocky structure; firm; many fine pores; thin discontinuous very dark grayish brown (10YR 3/2) clay films on faces of peds; 5 percent gravel; slight effervescence; moderately alkaline; clear smooth boundary.

2Cd—26 to 60 inches; olive (5Y 5/3) silt loam; common medium distinct gray (5Y 5/1) mottles; massive; firm; 5 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 20 to 40 inches.

The Ap horizon has hue of 10YR, value of 3, and chroma of 2 or 3.

The Bt horizon has hue of 5Y, 2.5Y, or 10YR, value of 4 or 5, and chroma of 3 to 6. It has mottles with chroma of 2 or less in the lower part.

The 2BCt horizon is mildly alkaline or moderately alkaline.

The 2Cd horizon has hue of 2.5Y or 5Y, value of 5, and chroma of 3 or 4.

Mellott Series

The Mellott series consists of very deep, well drained, moderately permeable soils on till plains. These soils formed in silty material and in the underlying glaciofluvial material and glacial till. Slopes range from 0 to 2 percent.

Mellott soils are similar to Camden and Tecumseh soils and are commonly adjacent to Millbrook, Throckmorton, and Toronto soils. Camden soils have a lighter colored surface layer than the Mellott soils. Tecumseh soils have a dark surface layer 10 or more inches thick. Millbrook and Toronto soils have gray mottles in the subsoil. They are at the slightly lower elevations and in drainageways. Throckmorton soils have gray mottles in the lower part of the subsoil. They are at the lower elevations.

Typical pedon of Mellott silt loam, 0 to 2 percent slopes, in a cultivated field; 740 feet east and 425 feet north of the southwest corner of sec. 17, T. 22 N., R. 4 W.

Ap—0 to 9 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; moderate medium granular structure; friable; very strongly acid; abrupt smooth boundary.

Bt1—9 to 13 inches; dark brown (10YR 4/3) silt loam; moderate fine subangular blocky structure; friable; common very fine pores; thin continuous dark brown (10YR 3/3) clay films on faces of peds; medium acid; clear smooth boundary.

Bt2—13 to 28 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure; firm; common very fine pores; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; strongly acid; clear smooth boundary.

2Bt3—28 to 33 inches; dark brown (7.5YR 4/4) loam; moderate medium subangular blocky structure; firm; common very fine pores; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; 5 percent gravel; strongly acid; clear smooth boundary.

2Bt4—33 to 42 inches; dark brown (7.5YR 3/2) sandy clay loam that has pockets of sandy loam; weak coarse subangular blocky structure; firm; common very fine pores; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; 10 percent gravel; strongly acid; clear wavy boundary.

3Bt5—42 to 47 inches; yellowish brown (10YR 5/4) fine sandy loam; weak coarse subangular blocky

structure; firm; common very fine pores; thin discontinuous very dark grayish brown (10YR 3/2) clay films on faces of peds; 5 percent gravel; slightly acid; clear smooth boundary.

3BCt—47 to 50 inches; yellowish brown (10YR 5/4) fine sandy loam; weak coarse subangular blocky structure; firm; thin discontinuous very dark grayish brown (10YR 3/2) clay films on faces of peds; 3 percent gravel; slight effervescence; moderately alkaline; clear smooth boundary.

3C—50 to 60 inches; yellowish brown (10YR 5/4) loam; moderate medium platy till structure; friable; 10 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the silty material ranges from 22 to 40 inches.

The Ap horizon has hue of 10YR, value of 3, and chroma of 2 or 3.

The Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. Reaction ranges from very strongly acid to medium acid.

The 2Bt horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6. It is sandy clay loam, loam, or sandy loam. Reaction is strongly acid or medium acid.

The 3Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 4. It is fine sandy loam or loam. Reaction is slightly acid or medium acid.

Miami Series

The Miami series consists of well drained soils on till plains and recessional moraines. These soils are moderately deep over compact glacial till. Permeability is moderate in the upper part of the subsoil, moderately slow in the lower part of the subsoil, and slow in the underlying material. The soils formed in a thin layer of silty material and in the underlying glacial till. Slopes range from 2 to 18 percent.

Miami soils are similar to Octagon and Strawn soils and are commonly adjacent to Crosby, Fincastle, Richardville, and Starks soils. Octagon soils have a darker surface layer than the Miami soils, and Strawn soils have a thinner solum. Crosby, Fincastle, and Starks soils are on toe slopes, in drainageways, and on the less sloping part of side slopes. They have gray mottles immediately below the surface layer. Also, Fincastle and Starks soils have less sand in the upper part of the subsoil than the Miami soils. Richardville soils have a thicker solum than the Miami soils. They are in the less sloping areas at the higher elevations.

Typical pedon of Miami silt loam, in an area of Crosby-Miami complex, 2 to 6 percent slopes, eroded, in a cultivated field; 1,980 feet west and 2,508 feet north of the southeast corner of sec. 14, T. 22 N., R. 3 W.

Ap—0 to 9 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; common fine distinct dark yellowish brown (10YR 4/4) pockets of clay loam material from the subsoil; moderate medium granular structure; friable; many medium roots; slightly acid; abrupt smooth boundary.

Bt1—9 to 17 inches; dark yellowish brown (10YR 4/4) clay loam; weak medium prismatic structure parting to moderate fine subangular blocky; firm; common fine roots; common fine pores; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; thin discontinuous light yellowish brown (10YR 6/4) silt coatings on faces of peds; strongly acid; clear smooth boundary.

Bt2—17 to 25 inches; dark yellowish brown (10YR 4/4) loam; weak medium prismatic structure parting to moderate coarse subangular blocky; firm; common fine roots; common fine pores; common thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; thin discontinuous light yellowish brown (10YR 6/4) silt coatings on faces of peds; 2 percent gravel; strongly acid; clear smooth boundary.

Bt3—25 to 36 inches; dark yellowish brown (10YR 4/4) sandy clay loam; weak coarse prismatic structure parting to weak coarse subangular blocky; firm; few fine roots; common fine pores; thin discontinuous dark brown (7.5YR 3/2) clay films on faces of peds; 8 percent gravel; neutral; clear wavy boundary.

Cd—36 to 60 inches; yellowish brown (10YR 5/4) fine sandy loam; weak medium and thick platy till structure; very firm; 10 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 24 to 40 inches. The thickness of the silty material ranges from 0 to 18 inches.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 to 4. It is dominantly silt loam, but the range includes loam and clay loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is silty clay loam, clay loam, sandy clay loam, or loam. Reaction ranges from strongly acid to neutral.

Some pedons have a BC horizon. This horizon is loam or fine sandy loam. Reaction is neutral or mildly alkaline.

The Cd horizon is loam or fine sandy loam.

Milford Series

The Milford series consists of very deep, very poorly drained, moderately slowly permeable soils on recessional moraines, till plains, and outwash plains. These soils formed in silty lacustrine sediments. Slopes range from 0 to 2 percent.

Milford soils are similar to Peotone soils and are commonly adjacent to Drummer, Mahalasville, and Treaty soils. Peotone soils have a dark surface layer 24 or more inches thick. Drummer, Mahalasville, and Treaty soils have less clay in the subsoil than the Milford soils. They are in the slightly higher positions on the landscape.

Typical pedon of Milford silty clay loam, pothole, in a cultivated field; 1,980 feet east and 400 feet north of the southwest corner of sec. 10, T. 21 N., R. 3 W.

Ap—0 to 11 inches; very dark gray (10YR 3/1) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; firm; neutral; abrupt smooth boundary.

A—11 to 15 inches; black (N 2/0) silty clay loam, very dark gray (10YR 3/1) dry; moderate coarse angular blocky structure; firm; common fine pores; slightly acid; clear smooth boundary.

Bg1—15 to 26 inches; dark gray (5Y 4/1) silty clay; few medium distinct olive (5Y 4/4) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; common fine pores; thin discontinuous black (N 2/0) organic coatings on faces of peds; slightly acid; clear smooth boundary.

Bg2—26 to 37 inches; dark grayish brown (2.5Y 4/2) silty clay loam; common medium prominent dark yellowish brown (10YR 4/6) mottles; weak medium prismatic structure parting to weak coarse subangular blocky; firm; common fine pores; thin discontinuous dark gray (10YR 4/1) organic coatings on faces of peds; neutral; clear smooth boundary.

Bg3—37 to 43 inches; dark grayish brown (2.5Y 4/2) silty clay loam; common fine distinct olive brown (2.5Y 4/4) mottles; weak coarse subangular blocky structure; firm; few fine pores; thin patchy dark gray (10YR 4/1) organic coatings on faces of peds; neutral; clear smooth boundary.

BCg—43 to 54 inches; olive gray (5Y 4/2) silty clay loam; few fine distinct olive (5Y 4/4) mottles; weak coarse subangular blocky structure; firm; mildly alkaline; clear smooth boundary.

Cg—54 to 60 inches; olive gray (5Y 4/2) silt loam; few fine distinct olive (5Y 4/4) mottles; massive; firm; slight effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 60 inches.

The Ap horizon has hue of 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. The total combined thickness of the A horizons ranges from 12 to 24 inches.

The Bg horizon has hue of 5Y, 2.5Y, or 10YR, value of 4 to 6, and chroma of 1 or 2. It is silty clay loam, clay loam, or silty clay. Reaction ranges from slightly acid to mildly alkaline.

The Cg horizon is mottled. It has hue of 5Y, 2.5Y, or 10YR, value of 4 to 6, and chroma of 1 or 2. It is silty clay loam, silt loam, or clay loam.

Millbrook Series

The Millbrook series consists of very deep, somewhat poorly drained, moderately permeable soils on till plains. These soils formed in loess or other silty material and in the underlying glaciofluvial deposits. Slopes range from 0 to 2 percent.

Millbrook soils are similar to Brenton and Starks soils and are commonly adjacent to Drummer, Octagon, Throckmorton, and Toronto soils. Brenton soils have a dark surface layer 10 or more inches thick. Starks soils have a lighter colored surface layer than the Millbrook soils. Drummer soils have a thicker surface layer than the Millbrook soils and have a grayer subsoil. They are in depressions and drainageways. Octagon soils have a dominantly brown subsoil. They are on rises and in the more sloping areas along drainageways. Throckmorton soils do not have gray mottles in the upper part of the subsoil. They are on rises and in the more sloping areas adjacent to drainageways. Toronto soils are underlain by glacial till. They are at the slightly higher elevations.

Typical pedon of Millbrook silt loam, in an area of Toronto-Millbrook complex, 0 to 2 percent slopes, in a cultivated field; 1,910 feet west and 440 feet south of the northeast corner of sec. 4, T. 21 N., R. 4 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; moderate medium granular structure; friable; many fine and medium roots; medium acid; abrupt smooth boundary.

Bt1—9 to 13 inches; light olive brown (2.5Y 5/6) silty clay loam; common fine prominent grayish brown (10YR 5/2) mottles; weak medium prismatic structure parting to moderate fine subangular blocky; firm; common fine roots; common fine pores; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; thin discontinuous very dark grayish brown (10YR 3/2) organic coatings on faces of peds; medium acid; clear smooth boundary.

Bt2—13 to 20 inches; light olive brown (2.5Y 5/6) silty clay loam; common medium prominent grayish brown (10YR 5/2) and distinct dark yellowish brown (10YR 4/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; common fine roots; common fine pores; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; thin discontinuous very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; clear smooth boundary.

Bt3—20 to 29 inches; yellowish brown (10YR 5/6) silty clay loam; common medium distinct grayish brown (10YR 5/2) and faint dark yellowish brown (10YR 4/6) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; common fine roots; common fine pores; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; thin discontinuous very dark grayish brown (10YR 3/2) organic coatings on faces of prisms; neutral; clear smooth boundary.

2Bt4—29 to 37 inches; yellowish brown (10YR 5/6) loam; common medium distinct grayish brown (10YR 5/2) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; common fine roots; common fine and medium pores; thin discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds and lining pores; krotovinas 2 inches in diameter filled with very dark grayish brown (10YR 3/2) silty clay loam material; 5 percent gravel; neutral; clear smooth boundary.

2Bt5—37 to 49 inches; yellowish brown (10YR 5/6) loam that has pockets of loamy sand and sandy loam; common medium distinct grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure; firm; few fine roots; common fine pores; thin discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds and lining pores; krotovinas 2 inches in diameter filled with very dark grayish brown (10YR 3/2) silty clay loam material; 5 percent gravel; neutral; clear wavy boundary.

2C—49 to 60 inches; yellowish brown (10YR 5/6) silt loam that has strata of loamy sand; common medium distinct grayish brown (10YR 5/2) mottles; massive; friable; few fine pores; krotovinas 2 inches in diameter filled with very dark grayish brown (10YR 3/2) silty clay loam material; 1 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the loess or silty material ranges from 24 to 40 inches.

The Ap horizon has hue of 10YR, value of 3, and chroma of 2 or 3.

The Bt horizon is mottled. It has hue of 2.5Y or 10YR, value of 4 or 5, and chroma of 2 to 6. Reaction ranges from strongly acid to neutral.

The 2Bt horizon has colors similar to those of the Bt horizon. It is clay loam, sandy clay loam, loam, or sandy loam. Reaction ranges from strongly acid to neutral.

The 2C horizon has hue of 2.5Y or 10YR, value of 5, and chroma of 2 to 6. Textures range from fine sandy loam to silt loam. Strata of sand or loamy sand are in all pedons.

Mulvey Series

The Mulvey series consists of somewhat poorly drained soils on outwash plains. These soils are deep or very deep over gravelly coarse sand. Permeability is moderate in the solum and very rapid in the underlying material. The soils formed in silty and loamy sediments and in the underlying gravelly outwash. Slopes range from 0 to 2 percent.

Mulvey soils are similar to Lafayette and Waynetown soils and are commonly adjacent to Bowes and Bowes Variant soils and to the Mahalasville soils that have a gravelly substratum. Lafayette soils have a dark surface layer 10 or more inches thick. Waynetown soils have a lighter colored surface layer than the Mulvey soils. Bowes and Bowes Variant soils have a browner subsoil than the Mulvey soils. They are in the slightly higher positions on the landscape. Mahalasville soils have a grayer subsoil than the Mulvey soils and have a dark surface layer 10 or more inches thick. They are in the lower lying depressional areas.

Typical pedon of Mulvey silt loam, 0 to 2 percent slopes, in a cultivated field; 1,640 feet west and 1,460 feet north of the southeast corner of sec. 20, T. 21 N., R. 5 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; neutral; abrupt smooth boundary.

Bt1—9 to 13 inches; yellowish brown (10YR 5/4) silt loam; few fine distinct grayish brown (10YR 5/2) mottles; moderate fine subangular blocky structure; firm; thin continuous grayish brown (10YR 5/2) clay films on faces of peds; medium acid; clear smooth boundary.

Bt2—13 to 29 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct grayish brown (10YR 5/2) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; thin continuous grayish brown (10YR 5/2) clay films on faces of peds; strongly acid; clear smooth boundary.

2Bt3—29 to 41 inches; dark yellowish brown (10YR 4/6)

clay loam; common medium prominent grayish brown (10YR 5/2) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; thin continuous grayish brown (10YR 5/2) clay films on faces of peds; 5 percent fine gravel; strongly acid; clear wavy boundary.

3Bt4—41 to 52 inches; dark yellowish brown (10YR 4/6) gravelly sandy clay loam; common medium prominent grayish brown (10YR 5/2) mottles; moderate coarse subangular blocky structure; firm; thin continuous grayish brown (10YR 5/2) clay films on faces of peds; 25 percent fine gravel; neutral; clear wavy boundary.

3Bg—52 to 66 inches; grayish brown (10YR 5/2) gravelly sandy loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; friable; thin continuous gray (10YR 5/1) clay films on faces of peds; 20 percent fine gravel; neutral; clear wavy boundary.

3Cg—66 to 80 inches; gray (10YR 5/1) gravelly coarse sand; single grained; loose; 25 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 50 to 70 inches. The thickness of the silty material ranges from 22 to 40 inches.

The Ap horizon has hue of 10YR, value of 3, and chroma of 2 or 3.

The Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 6. Reaction ranges from very strongly acid to medium acid.

The 2Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 6. It is sandy clay loam, clay loam, or loam. Reaction ranges from very strongly acid to medium acid.

The 3Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 6. Reaction ranges from strongly acid to neutral.

The 3Cg horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. It is gravelly coarse sand or gravelly loamy sand.

Muskego Series

The Muskego series consists of very deep, very poorly drained soils on till plains, recessional moraines, outwash plains, and terraces. These soils formed in organic deposits overlying coprogenous earth. Permeability is moderate or moderately rapid in the organic material and slow in the underlying coprogenous earth. Slopes range from 0 to 2 percent.

Muskego soils are similar to Houghton and Palms soils and are commonly adjacent to Drummer, Mahalasville, Pella, and Treaty soils. Houghton soils formed in more than 51 inches of organic material. Palms soils formed in organic deposits overlying mineral material. Drummer, Mahalasville, Pella, and Treaty soils formed in mineral material. They are at the higher elevations.

Typical pedon of Muskego muck, drained, in an idle field; 150 feet west and 1,450 feet south of the northeast corner of sec. 36, T. 21 N., R. 4 W.

Op—0 to 10 inches; sapric material, black (10YR 2/1) broken face and rubbed; 5 percent fiber, trace rubbed; moderate fine granular structure; many very fine roots; 5 percent mineral material; neutral; clear smooth boundary.

Oa1—10 to 28 inches; sapric material, black (10YR 2/1) broken face and rubbed; 5 percent fiber, trace rubbed; moderate medium platy structure parting to moderate medium subangular blocky; friable; common very fine roots; neutral; clear smooth boundary.

Oa2—28 to 39 inches; sapric material, very dark gray (10YR 3/1) broken face and rubbed; 15 percent fiber, trace rubbed; moderate thick platy structure; firm; neutral; clear smooth boundary.

2C—39 to 60 inches; dark olive gray (5Y 3/2) coprogenous earth; massive; slightly plastic; mildly alkaline.

The thickness of the organic material and the depth to coprogenous earth range from 16 to 51 inches.

The surface tier has hue of 10YR or is neutral in hue. It has value of 2 and chroma of 0 or 1.

The subsurface and bottom tiers have hue of 7.5YR or 10YR or are neutral in hue. They have value of 2 or 3 and chroma of 0 to 2. They are primarily sapric material, but some pedons have thin layers of hemic material. Reaction is slightly acid or neutral.

The 2C horizon has hue of 2.5Y, 5Y, or 10YR, value of 2 to 5, and chroma of 1 to 3. Reaction ranges from neutral to moderately alkaline.

Oakville Series

The Oakville series consists of very deep, somewhat excessively drained, rapidly permeable soils on sand dunes. These soils formed in eolian sandy sediments. Slopes range from 2 to 6 percent.

Oakville soils are similar to Coloma, Sparta, and Spinks soils and are commonly adjacent to La Hogue soils and to the moderately wet Billett soils. Coloma, Sparta, and Spinks soils have bands in the subsoil. Coloma and Sparta soils have medium-sized sand. Also, Sparta soils have a darker surface layer than the Oakville soils. Billett and La Hogue soils are at the lower elevations. Billett soils have more clay in the subsoil than the Oakville soils and have gray mottles in

the lower part of the subsoil. La Hogue soils have gray mottles in the upper part of the subsoil.

Typical pedon of Oakville loamy fine sand, in an area of Oakville-Billett, moderately wet, complex, 2 to 6 percent slopes, eroded, in a cultivated field; 900 feet south and 600 feet west of the northeast corner of sec. 6, T. 24 N., R. 5 W.

Ap—0 to 8 inches; dark brown (10YR 3/3) loamy fine sand, brown (10YR 5/3) dry; common medium faint dark yellowish brown (10YR 4/4) pockets of material from the subsoil; moderate medium granular structure; friable; common medium roots; neutral; abrupt smooth boundary.

Bw1—8 to 13 inches; dark yellowish brown (10YR 4/4) loamy fine sand; weak fine and medium subangular blocky structure; friable; common medium roots; neutral; clear wavy boundary.

Bw2—13 to 20 inches; yellowish brown (10YR 5/6) loamy fine sand; weak fine and medium subangular blocky structure; very friable; common medium roots; thin continuous dark yellowish brown (10YR 4/4) coatings on faces of peds; neutral; clear wavy boundary.

Bw3—20 to 30 inches; yellowish brown (10YR 5/6) loamy fine sand; weak fine and medium subangular blocky structure; very friable; common medium roots; thin continuous yellowish brown (10YR 5/4) coatings on faces of peds; neutral; gradual wavy boundary.

Bw4—30 to 41 inches; yellowish brown (10YR 5/6) loamy fine sand; weak fine and medium subangular blocky structure; very friable; few very fine roots; thin continuous dark yellowish brown (10YR 4/4) coatings on faces of peds; medium acid; gradual wavy boundary.

Bw5—41 to 47 inches; yellowish brown (10YR 5/6) loamy fine sand; weak fine and medium subangular blocky structure; very friable; few very fine roots; thin discontinuous yellowish brown (10YR 5/4) coatings on faces of peds; slightly acid; gradual wavy boundary.

Bw6—47 to 54 inches; dark yellowish brown (10YR 4/6) loamy fine sand; weak fine and medium subangular blocky structure; very friable; few very fine roots; thin continuous dark yellowish brown (10YR 4/4) coatings on faces of peds; medium acid; gradual wavy boundary.

Bw7—54 to 60 inches; yellowish brown (10YR 5/4) loamy fine sand; weak medium subangular blocky structure; very friable; few very fine roots; thin continuous dark yellowish brown (10YR 4/4) coatings on faces of peds; slightly acid; gradual wavy boundary.

Bw8—60 to 68 inches; yellowish brown (10YR 5/6) loamy fine sand; weak medium subangular blocky structure; very friable; few very fine roots; thin continuous dark yellowish brown (10YR 4/4) and thin patchy yellowish brown (10YR 5/4) coatings on faces of peds; medium acid; gradual wavy boundary.

Bw9—68 to 80 inches; yellowish brown (10YR 5/8) loamy fine sand; weak medium subangular blocky structure; very friable; few very fine roots; thin continuous dark yellowish brown (10YR 4/4) coatings on faces of peds; medium acid.

The solum is more than 80 inches thick.

The Ap horizon has hue of 10YR, value of 3, and chroma of 2 or 3. It is fine sand or loamy fine sand.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 or 5, chroma of 4 to 6. It is loamy fine sand or fine sand. Reaction ranges from very strongly acid to neutral.

Ockley Series

The Ockley series consists of well drained soils on outwash plains and stream terraces. These soils are deep or very deep over very gravelly coarse sand. Permeability is moderate in the solum and very rapid in the underlying material. The soils formed in silty material, in loamy outwash, and in the underlying gravelly outwash. Slopes range from 0 to 2 percent.

Ockley soils are similar to Kalamazoo and Longlois soils and are commonly adjacent to Kosciusko soils. Kalamazoo soils have less clay in the lower part of the subsoil than the Ockley soils. Longlois soils have a darker surface layer than the Ockley soils. Kosciusko soils have a thinner solum than the Ockley soils. They are in the more sloping areas along terrace breaks and drainageways.

Typical pedon of Ockley silt loam, 0 to 2 percent slopes, in a cultivated field; 1,450 feet west and 2,510 feet south of the northeast corner of sec. 26, T. 22 N., R. 3 W.

Ap—0 to 11 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak medium granular structure; friable; many fine roots; medium acid; abrupt smooth boundary.

Bt1—11 to 14 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium subangular blocky structure; friable; common fine roots; common fine pores; thin discontinuous brown (7.5YR 4/4) clay films on faces of peds; thin continuous brown (10YR 4/3) organic coatings on faces of peds; medium acid; clear smooth boundary.

2Bt2—14 to 20 inches; brown (7.5YR 4/4) clay loam;

moderate medium subangular blocky structure; firm; common fine roots; common fine pores; thin continuous brown (7.5YR 4/4) clay films on faces of peds; 4 percent gravel; medium acid; clear smooth boundary.

2Bt3—20 to 30 inches; brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; firm; few fine roots; common fine pores; thin continuous brown (7.5YR 4/4) clay films on faces of peds; 4 percent gravel; medium acid; clear smooth boundary.

2Bt4—30 to 42 inches; brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; firm; few fine roots; common fine pores; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; 4 percent gravel; slightly acid; clear smooth boundary.

3Bt5—42 to 53 inches; brown (7.5YR 4/4) gravelly clay loam; moderate medium subangular blocky structure; firm; few fine roots; common fine pores; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; 30 percent gravel; medium acid; clear smooth boundary.

3Bt6—53 to 58 inches; brown (7.5YR 4/4) gravelly clay loam; weak coarse subangular blocky structure grading to moderate medium subangular blocky; firm; few fine roots; common fine pores; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; 15 percent gravel; slightly acid; clear smooth boundary.

3BCt—58 to 63 inches; dark brown (7.5YR 3/4) coarse sandy loam; weak coarse subangular blocky structure; firm; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; clay bridges between sand grains; 12 percent gravel; slight effervescence; moderately alkaline; clear smooth boundary.

4C—63 to 80 inches; yellowish brown (10YR 5/4) very gravelly coarse sand; single grained; loose; 47 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 50 to 72 inches. The thickness of the silt ranges from 9 to 20 inches.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 or 3.

The Bt horizon, if it occurs, has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. It is strongly acid to medium acid. It is silt loam or silty clay loam.

The 2Bt horizon has hue of 7.5YR or 10YR, value of 4, and chroma of 4 to 6. It is clay loam or sandy clay loam. Reaction ranges from very strongly acid to medium acid.

The 3Bt horizon has colors similar to those of the 2Bt horizon. It is gravelly sandy clay loam or gravelly clay loam.

The 4C horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. Textures include sand, gravelly sand, and very gravelly coarse sand.

Octagon Series

The Octagon series consists of well drained soils on till plains and recessional moraines. These soils are moderately deep over compact glacial till. Permeability is moderate in the solum and slow in the underlying material. The soils formed in a thin layer of silty material and in the underlying glacial till. Slopes range from 2 to 12 percent.

Octagon soils are similar to Miami and Strawn soils and are commonly adjacent to Lauramie, Millbrook, and Toronto soils. Miami and Strawn soils have a lighter colored surface layer than the Octagon soils. Lauramie soils formed in glaciofluvial sediments and in the underlying friable glacial till. They are in the less sloping areas at the higher elevations. Millbrook and Toronto soils have gray mottles in the subsoil. They are in drainageways and at the slightly lower elevations.

Typical pedon of Octagon silt loam, 2 to 6 percent slopes, eroded, in a cultivated field; 1,770 feet west and 410 feet north of the southeast corner of sec. 14, T. 22 N., R. 4 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; common fine distinct dark yellowish brown (10YR 4/4) pockets of silty clay loam material from the subsoil; moderate medium granular structure; friable; medium acid; abrupt smooth boundary.

Bt1—8 to 12 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak medium prismatic structure parting to moderate very fine and fine subangular blocky; firm; thin continuous very dark grayish brown (10YR 3/2) clay films on faces of peds; strongly acid; clear smooth boundary.

2Bt2—12 to 21 inches; dark yellowish brown (10YR 4/4) sandy clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; firm; common fine pores; thin discontinuous dark brown (10YR 3/3) clay films on faces of peds; 5 percent gravel; strongly acid; gradual smooth boundary.

2Bt3—21 to 29 inches; yellowish brown (10YR 5/4) sandy clay loam; weak medium prismatic structure parting to weak medium subangular blocky; firm; common fine pores; thin discontinuous dark brown (10YR 3/3) and brown (10YR 4/3) clay films on faces of peds; few medium black (N 2/0) iron and

manganese oxide stains; 5 percent gravel; strongly acid; gradual smooth boundary.

2Bt4—29 to 37 inches; yellowish brown (10YR 5/4) sandy clay loam; weak coarse subangular blocky structure; firm; common fine pores; thin patchy dark brown (10YR 3/3) clay films on faces of peds; common medium black (N 2/0) iron and manganese oxide stains; 8 percent gravel; strongly acid; clear wavy boundary.

2Cd—37 to 60 inches; brown (10YR 5/3) fine sandy loam; weak medium and thick platy till structure; very firm; 10 percent gravel; strong effervescence; mildly alkaline.

The thickness of the solum ranges from 24 to 40 inches. The thickness of the silty material ranges from 0 to 18 inches.

The Ap horizon has hue of 10YR, value of 3, and chroma of 2 or 3. It is silt loam or clay loam.

The Bt horizon, if it occurs, has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. Reaction ranges from medium acid to neutral.

The 2Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. It is clay loam, sandy clay loam, or loam. Reaction ranges from strongly acid to neutral.

The 2Cd horizon has hue of 2.5Y or 10YR, value of 5, and chroma of 3 or 4. It is loam or fine sandy loam.

Ouiatenon Series

The Ouiatenon series consists of somewhat excessively drained soils on flood plains. These soils are mainly deep over coarse sand, gravelly coarse sand, very gravelly coarse sand, loamy sand, sand, gravelly sand, and very gravelly sand. The sandy substratum phase is very deep. Permeability is generally rapid in the upper part of the underlying material and very rapid in the lower part. In the sandy substratum phase, permeability is rapid. The soils formed in sandy and gravelly alluvium. Slopes range from 0 to 2 percent.

Ouiatenon soils are commonly adjacent to Battleground, Ceresco, Cohoctah, and Lash soils. Battleground soils have more clay and less sand throughout the solum than the Ouiatenon soils. They are at the slightly lower elevations. Ceresco soils have gray mottles immediately below the surface layer. They are in areas farther away from stream channels than the Ouiatenon soils, adjacent to uplands. Cohoctah soils have a dominantly gray subsoil. They are on the slightly lower flood plains adjacent to uplands. Lash soils have more clay in the subsoil than the Ouiatenon soils. They are in the slightly lower areas away from stream channels.

Typical pedon of Ouiatenon loamy sand, occasionally flooded, in a cultivated field; 1,000 feet west and 850 feet south of the northeast corner of sec. 21, T. 22 N., R. 4 W.

Ap—0 to 12 inches; very dark gray (10YR 3/1) loamy sand, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; very friable; few pebbles; slight effervescence; moderately alkaline; abrupt smooth boundary.

A—12 to 16 inches; very dark grayish brown (10YR 3/2) loamy sand, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure; very friable; thin discontinuous very dark gray (10YR 3/1) organic coatings on faces of peds; 3 percent fine gravel; strong effervescence; moderately alkaline; clear smooth boundary.

AC—16 to 20 inches; dark brown (10YR 3/3) coarse sand, brown (10YR 5/3) dry; weak medium subangular blocky structure; very friable; thin discontinuous very dark grayish brown (10YR 3/2) organic coatings on faces of peds; 10 percent fine gravel; strong effervescence; moderately alkaline; clear wavy boundary.

C1—20 to 48 inches; dark brown (10YR 4/3) coarse sand that has one 2-inch layer of very gravelly sand; single grained; loose; 10 percent fine gravel; strong effervescence; moderately alkaline; clear smooth boundary.

C2—48 to 60 inches; dark brown (10YR 4/3) very gravelly coarse sand; single grained; loose; 38 percent gravel; strong effervescence; moderately alkaline.

The A horizon has hue of 10YR, value of 3, and chroma of 1 to 3. It ranges from 10 to 23 inches in thickness. It is fine sandy loam, sandy loam, or loamy sand.

The C horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. Above a depth of 40 inches, it is loamy sand, sand, or coarse sand. The gravelly and very gravelly analogs of these textures are below a depth of 40 inches.

Palms Series

The Palms series consists of very deep, very poorly drained soils on till plains, recessional moraines, and outwash plains, in glacial troughs, and on terraces. The gravelly substratum phase is deep over gravelly coarse sand. Permeability generally is moderate or moderately rapid in the organic material and moderate in the underlying loamy material. In the gravelly substratum phase, it is moderately rapid in the organic material and very rapid in the underlying material. The soils formed in organic deposits overlying loamy or sandy material.

Slopes range from 0 to 2 percent.

Palms soils are similar to Houghton and Muskego soils and are commonly adjacent to Drummer, Mahalasville, Pella, and Treaty soils. Houghton soils formed in more than 51 inches of organic material. Muskego soils formed in organic material overlying coprogenous earth. Drummer, Mahalasville, Pella, and Treaty soils formed in mineral material. They are in the slightly higher areas.

Typical pedon of Palms muck, drained, in an idle field; 2,245 feet west and 1,585 feet south of the northeast corner of sec. 25, T. 21 N., R. 6 W.

Op—0 to 10 inches; sapric material, black (N 2/0) broken face and rubbed; 5 percent fiber, trace rubbed; moderate fine subangular blocky structure; many very fine roots; 5 percent mineral material; strongly acid; clear smooth boundary.

Oa1—10 to 27 inches; sapric material, very dark grayish brown (10YR 3/2) broken face and rubbed; 20 percent fiber, trace rubbed; moderate coarse prismatic structure; friable; common fine and very fine roots; 5 percent mineral material; neutral; clear smooth boundary.

Oa2—27 to 36 inches; sapric material, dark gray (N 4/0) broken face and rubbed; 5 percent fiber, trace rubbed; massive; friable; common very fine roots; 5 percent mineral material; strong effervescence; mildly alkaline; gradual smooth boundary.

2Cg1—36 to 56 inches; dark gray (N 4/0) silt loam; massive; firm; 1 percent gravel; strong effervescence; moderately alkaline; clear smooth boundary.

2Cg2—56 to 60 inches; dark gray (N 4/0) silt loam; massive; firm; 10 percent gravel; strong effervescence; moderately alkaline.

The thickness of the organic material ranges from 16 to 50 inches. Reaction ranges from strongly acid to mildly alkaline in the organic material.

The surface tier has hue of 10YR or is neutral in hue. It has value of 2 and chroma of 0 or 1. The mineral content ranges from 5 to 50 percent.

The subsurface and bottom tiers have hue of 7.5YR or 10YR or are neutral in hue. They have value of 2 to 4 and chroma of 0 to 2. They are primarily sapric material, but thin layers of hemic material with a combined thickness of less than 10 inches are in some pedons. Reaction ranges from slightly acid to mildly alkaline.

The 2Cg horizon has hue of 2.5Y, 5Y, or 10YR or is neutral in hue. It has value of 4 to 6 and chroma of 0 to 2. It is loam or silt loam.

Palms muck, gravelly substratum, undrained, is a taxadjunct because it is underlain by sandy material instead of loamy material and because it is calcareous throughout. These differences, however, do not affect the use or behavior of this soil. The soil is classified as sandy or sandy-skeletal, mixed, euic, mesic Terric Medisaprists.

Pella Series

The Pella series consists of very deep, very poorly drained, moderately permeable soils on outwash plains and till plains. These soils formed in silty sediments underlain by loamy outwash. Slopes range from 0 to 2 percent.

Pella soils are commonly adjacent to Drummer, Mahalasville, and Treaty soils. Drummer, Mahalasville, and Treaty soils have a thicker solum than the Pella soils. They are in the higher positions on the landscape.

Typical pedon of Pella silty clay loam, pothole, in a cultivated field; 1,810 feet east and 360 feet south of the northwest corner of sec. 13, T. 22 N., R. 4 W.

Ap—0 to 10 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate medium granular structure; firm; neutral; abrupt smooth boundary.

A—10 to 15 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; common fine prominent dark gray (5Y 4/1) mottles; weak medium prismatic structure parting to weak medium subangular blocky; firm; common fine roots; neutral; clear smooth boundary.

Bg1—15 to 23 inches; olive gray (5Y 5/2) silty clay loam; common medium prominent light olive brown (2.5Y 5/6) mottles; weak coarse prismatic structure parting to weak coarse subangular blocky; firm; common fine pores; thin discontinuous very dark gray (N 3/0) and patchy black (10YR 2/1) organic coatings on faces of peds; krotovina 2 inches in diameter filled with black (10YR 2/1) silty clay loam material; neutral; clear smooth boundary.

Bg2—23 to 31 inches; olive gray (5Y 5/2) silt loam; common medium prominent light olive brown (2.5Y 5/6) mottles; weak coarse prismatic structure parting to weak coarse subangular blocky; firm; common fine pores; thin discontinuous very dark gray (10YR 3/1) organic coatings on faces of peds; krotovina 2 inches in diameter filled with black (10YR 2/1) silty clay loam material; slight effervescence; mildly alkaline; clear smooth boundary.

Cg1—31 to 35 inches; grayish brown (2.5Y 5/2) silt loam; many coarse distinct light olive brown (2.5Y 5/4) mottles; massive; firm; few fine pores; thin continuous dark gray (10YR 4/1) organic coatings in pores; krotovina 2 inches in diameter filled with

black (10YR 2/1) silty clay loam material; strong effervescence; moderately alkaline; clear smooth boundary.

Cg2—35 to 46 inches; grayish brown (2.5Y 5/2) silt loam; many coarse distinct light olive brown (2.5Y 5/4) mottles; massive; firm; few fine pores; thin continuous very dark gray (10YR 3/1) organic coatings in pores; krotovina 2 inches in diameter filled with black (10YR 2/1) silty clay loam material; strong effervescence; moderately alkaline; clear smooth boundary.

2Cg3—46 to 60 inches; grayish brown (2.5Y 5/2) silt loam that has one 4-inch layer of gravelly sandy loam; common medium distinct light olive brown (2.5Y 5/4) mottles; massive; friable; about 25 percent sand; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 30 to 50 inches. The depth to free carbonates ranges from 20 to 40 inches.

The Ap and A horizons have hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The total combined thickness of the A horizons ranges from 10 to 24 inches.

The Bg horizon is mottled. It has hue of 5Y, 2.5Y, or 10YR, value of 4 to 6, and chroma of 1 or 2. Reaction is neutral or mildly alkaline.

The 2Cg horizon is mottled. It has hue of 5Y, 2.5Y, or 10YR, value of 5 or 6, and chroma of 1 to 4. It is loam, silt loam, silty clay loam, clay loam, or sandy loam.

Peotone Series

The Peotone series consists of very deep, very poorly drained soils on till plains and recessional moraines. These soils formed in silty lacustrine sediments. Permeability is moderately slow or slow in the solum and moderately slow in the underlying material. Slopes range from 0 to 2 percent.

Peotone soils are similar to Milford soils and are commonly adjacent to Drummer soils. Milford soils have a dark surface layer less than 24 inches thick. Drummer soils have less clay in the subsoil than the Peotone soils and have a thinner surface layer. They are in the slightly higher positions on the landscape.

Typical pedon of Peotone silty clay loam, pothole, in a cultivated field; 1,320 feet west and 1,715 feet north of the southeast corner of sec. 18, T. 24 N., R. 5 W.

Ap—0 to 10 inches; very dark gray (10YR 3/1) silty clay loam, dark grayish brown (10YR 4/2) dry; weak very fine subangular blocky structure; firm; slightly acid; abrupt smooth boundary.

A1—10 to 19 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate very fine and fine subangular blocky structure; firm; many very fine pores; slightly acid; gradual smooth boundary.

A2—19 to 29 inches; black (10YR 2/1) silty clay, very dark gray (10YR 3/1) dry; moderate medium subangular blocky structure; very firm; many very fine and fine pores; slightly acid; gradual smooth boundary.

Bg1—29 to 33 inches; black (N 2/0) silty clay, very dark gray (10YR 3/1) dry; common medium prominent distinct olive (2.5Y 4/2) mottles; moderate medium and coarse subangular blocky structure; very firm; many very fine pores; neutral; gradual wavy boundary.

Bg2—33 to 42 inches; dark grayish brown (2.5Y 4/2) silty clay; common medium distinct olive brown (2.5Y 4/4) mottles; moderate medium and coarse prismatic structure; very firm; many very fine and fine pores; thin discontinuous very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; clear smooth boundary.

Bg3—42 to 50 inches; dark grayish brown (2.5Y 4/2) silty clay; common medium distinct olive brown (2.5Y 4/4) mottles; weak medium prismatic structure; very firm; many very fine and fine pores; thin discontinuous very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; clear smooth boundary.

BCg—50 to 55 inches; dark grayish brown (2.5Y 4/2) silty clay loam; many medium distinct olive brown (2.5Y 4/4) mottles; weak coarse subangular blocky structure; firm; thin continuous dark gray (10YR 3/1) organic coatings in pores; neutral; gradual wavy boundary.

Cg—55 to 60 inches; olive gray (5Y 4/2) silty clay loam; massive; firm; neutral.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the mollic epipedon ranges from 24 to 36 inches.

The A horizon has hue of 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 or 1.

The Bg horizon has hue of 5Y, 2.5Y, or 10YR or is neutral in hue. It has value of 2 to 5 and chroma of 0 to 2. It is silty clay or silty clay loam. Reaction ranges from slightly acid to mildly alkaline.

The Cg horizon has hue of 5Y, value of 4 to 6, and chroma of 1 or 2. It is silt loam or silty clay loam.

Pinevillage Series

The Pinevillage series consists of well drained, very deep, moderately rapidly permeable soils on flood

plains. These soils formed in loamy alluvium. Slopes range from 2 to 8 percent.

Pinevillage soils are commonly adjacent to Lash, Sawabash, and Tice soils. Lash soils have a darker surface layer than the Pinevillage soils and have less gravel in the subsoil and underlying material. Sawabash and Tice soils have a grayer subsoil, a darker surface layer, and less sand and gravel in the subsoil than the Pinevillage soils. They are in the lower areas on flood plains.

Typical pedon of Pinevillage gravelly sandy loam, 2 to 8 percent slopes, rarely flooded, in a walnut plantation; 1,600 feet west and 910 feet north of the southeast corner of sec. 24, T. 23 N., R. 6 W.

Ap—0 to 8 inches; dark brown (10YR 3/3) gravelly sandy loam, pale brown (10YR 6/3) dry; weak medium granular structure; friable; common fine roots; 20 percent gravel; slight effervescence; moderately alkaline; abrupt smooth boundary.

C1—8 to 24 inches; dark brown (10YR 4/3) gravelly sandy loam; weak fine subangular blocky structure; friable; common very fine roots; 30 percent gravel; 10 percent cobbles; 2 percent stones; slight effervescence; moderately alkaline; clear smooth boundary.

C2—24 to 45 inches; dark brown (10YR 4/3) very gravelly sandy loam; weak fine subangular blocky structure; friable; common very fine roots; 40 percent gravel; 10 percent cobbles; 5 percent stones; slight effervescence; moderately alkaline; clear smooth boundary.

C3—45 to 55 inches; dark brown (10YR 4/3) gravelly loam; weak fine subangular blocky structure; friable; common very fine roots; 15 percent gravel; slight effervescence; moderately alkaline; clear wavy boundary.

C4—55 to 60 inches; dark yellowish brown (10YR 4/4) gravelly loamy sand; single grained; loose; 8 percent cobbles, 3 percent stones, 20 percent gravel; slight effervescence; moderately alkaline.

The content of coarse fragments averages 35 to 50 percent in the 10- to 40-inch control section.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 3.

The C horizon has hue of 10YR and value and chroma of 3 or 4.

Rainsville Series

The Rainsville series consists of moderately well drained soils on till plains and recessional moraines. These soils are deep over compact glacial till. Permeability is moderate in the upper part of the solum, moderately slow in the lower part of the solum, and slow in the underlying material. The soils formed in silty material, in loamy glaciofluvial material, and in the underlying glacial till. Slopes range from 2 to 6 percent.

Rainsville soils are commonly adjacent to Fincastle, Miami, and Starks soils. Fincastle and Starks soils have a grayer subsoil than the Rainsville soils and have less sand in the upper part of the subsoil. They are in drainageways and the less sloping areas. Miami soils do not have gray mottles in the lower part of the subsoil and have a solum that is less than 40 inches thick. They are on knobs and in the more sloping areas along drainageways.

Typical pedon of Rainsville silt loam, 2 to 6 percent slopes, eroded, in a cultivated field; 2,300 feet west and 2,300 feet north of the southeast corner of sec. 2, T. 23 N., R. 6 W.

Ap—0 to 9 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; common fine dark yellowish brown (10YR 4/4) pockets of silty clay loam material from the subsoil; moderate medium granular structure; friable; medium acid; abrupt smooth boundary.

Bt1—9 to 14 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure; firm; common fine roots; common fine pores; thin continuous brown (10YR 4/3) clay films on faces of peds; thin discontinuous light yellowish brown (10YR 6/4) silt coatings on faces of peds; medium acid; clear wavy boundary.

2Bt2—14 to 24 inches; dark yellowish brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; firm; common fine roots; common fine pores; common thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; 2 percent gravel; strongly acid; clear smooth boundary.

2Bt3—24 to 37 inches; dark yellowish brown (7.5YR 4/4) clay loam; medium coarse subangular blocky structure; firm; few fine roots; common fine pores; thin discontinuous dark brown (7.5YR 3/2) clay films on faces of peds; 5 percent gravel; strongly acid; clear wavy boundary.

2Bt4—37 to 41 inches; dark yellowish brown (10YR 4/4) sandy loam; weak coarse subangular blocky structure; firm; thin continuous brown (10YR 4/3) clay films on faces of peds; 5 percent gravel; strongly acid; clear wavy boundary.

3Bt5—41 to 49 inches; dark yellowish brown (10YR 4/4) clay loam; few medium distinct grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure; firm; common thin continuous brown (10YR 4/3) clay films on faces of peds; 5 percent

gravel; neutral; clear smooth boundary.

3BCt—49 to 54 inches; light olive brown (2.5Y 5/4) loam; common medium prominent grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure; firm; thin discontinuous brown (10YR 4/3) clay films on faces of peds; 10 percent gravel; slight effervescence; mildly alkaline; clear wavy boundary.

3Cd—54 to 60 inches; light olive brown (2.5Y 5/4) loam; weak medium and thick platy till structure; very firm; 10 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 45 to 60 inches. The thickness of the silty material ranges from 0 to 20 inches.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 to 4.

The Bt horizon, if it occurs, has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. Reaction ranges from medium acid to neutral.

The 2Bt horizon has hue of 7.5YR or 10YR and value and chroma of 4 to 6. Reaction ranges from very strongly acid to medium acid.

The 3Bt horizon has hue of 2.5Y or 10YR, value of 4 or 5, and chroma of 3 or 4. Reaction is neutral or mildly alkaline.

The 3Cd horizon has hue of 2.5Y, value of 5, and chroma of 3 or 4.

Raub Series

The Raub series consists of somewhat poorly drained soils on till plains. These soils are deep over compact glacial till. Permeability is moderate in the upper part of the solum, moderately slow in the lower part of the solum, and slow in the underlying material. The soils formed in silty material and in the underlying glacial till. Slopes are 0 to 1 percent.

Raub soils are similar to Toronto soils and are commonly adjacent to Brenton, Drummer, and Throckmorton soils. Toronto soils have a dark surface layer less than 10 inches thick. Brenton soils are underlain by loamy outwash. They are at the slightly lower elevations. Drummer soils have a grayer subsoil than the Raub soils and are underlain by loamy and sandy outwash. They are in depressions and drainageways. Throckmorton soils have a browner subsoil than the Raub soils. They are on rises and in the more sloping areas.

Typical pedon of Raub silt loam, in an area of Raub-Brenton complex, 0 to 1 percent slopes, in a cultivated field; 1,650 feet west and 1,020 feet north of the southeast corner of sec. 33, T. 22 N., R. 5 W.

Ap—0 to 11 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; common very fine roots; slightly acid; abrupt smooth boundary.

Bt—11 to 16 inches; light olive brown (2.5Y 5/4) silty clay loam; common medium prominent dark grayish brown (10YR 4/2) mottles; moderate fine subangular blocky structure; firm; common very fine roots; common very fine pores; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; thin patchy very dark grayish brown (10YR 3/2) organic coatings on faces of peds; medium acid; clear smooth boundary.

Btg1—16 to 23 inches; grayish brown (2.5Y 5/2) silty clay loam; common medium prominent yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; firm; common very fine roots; many fine pores; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; strongly acid; gradual smooth boundary.

Btg2—23 to 29 inches; grayish brown (2.5Y 5/2) silty clay loam; common medium prominent yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; firm; few very fine roots; many very fine pores; thin continuous dark grayish brown (2.5Y 4/2) clay films on faces of peds; medium acid; gradual smooth boundary.

Btg3—29 to 34 inches; grayish brown (2.5Y 5/2) silt loam; many coarse prominent yellowish brown (10YR 5/8) mottles; moderate coarse subangular blocky structure; firm; few very fine roots; many very fine pores; thin continuous dark grayish brown (2.5Y 4/2) and very dark gray (10YR 3/1) clay films on faces of peds; neutral; clear smooth boundary.

2Btg4—34 to 41 inches; grayish brown (2.5Y 5/2) loam; common medium prominent yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; firm; few very fine roots; many very fine pores; thin discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; 3 percent gravel; neutral; clear wavy boundary.

2BCt—41 to 53 inches; light olive brown (2.5Y 5/4) loam; common medium prominent yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; firm; common very fine pores; thin discontinuous dark grayish brown (10YR 4/2) and very dark gray (N 3/0) clay films on faces of peds; 5 percent gravel; slight effervescence; moderately alkaline; clear wavy boundary.

2Cd—53 to 60 inches; light olive brown (2.5Y 5/4) loam; common medium prominent grayish brown (10YR 5/2) and yellowish brown (10YR 5/8) mottles; weak medium platy till structure; very firm; 5 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the silty material ranges from 24 to 40 inches.

The Ap horizon has hue of 10YR, value of 3, and chroma of 1 or 2.

The Bt horizon has hue of 2.5Y or 10YR, value of 4 or 5, and chroma of 2 to 6. Reaction ranges from strongly acid to slightly acid.

The 2Bt horizon has hue of 2.5Y or 10YR, value of 4 or 5, and chroma of 2 to 6. It is clay loam or loam. Reaction is slightly acid or neutral.

The 2Cd horizon has hue of 2.5Y or 10YR, value of 5, and chroma of 3 or 4.

Richardville Series

The Richardville series consists of very deep, well drained, moderately permeable soils on till plains and recessional moraines. These soils formed in a thin layer of silty material and in the underlying glaciofluvial material and glacial till. Slopes range from 0 to 12 percent.

Richardville soils are similar to Lauramie soils and are commonly adjacent to Fincastle, Miami, Rockfield, and Starks soils. Lauramie soils have a darker surface layer than the Richardville soils. Fincastle soils have gray mottles in the subsoil. They are at the slightly lower elevations. Miami soils formed in compact glacial till and have a solum less than 40 inches thick. They are in the more sloping areas. Rockfield and Starks soils are at the slightly lower elevations. Rockfield soils have gray mottles in the lower part of the subsoil. Starks soils have gray mottles in the subsoil and have stratified underlying material.

Typical pedon of Richardville silt loam, 2 to 6 percent slopes, eroded, in a cultivated field; 2,440 feet east and 920 feet south of the northwest corner of sec. 10, T. 23 N., R. 3 W.

Ap—0 to 7 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; common coarse dark brown (7.5YR 4/4) pockets of silty clay loam material from the subsoil; weak medium granular structure; friable; common fine roots; 1 percent gravel; medium acid; abrupt smooth boundary.

Bt1—7 to 13 inches; dark brown (7.5YR 4/4) clay loam; weak fine and medium subangular blocky structure; firm; common fine roots; common fine pores; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; 2 percent gravel; very strongly acid; clear smooth boundary.

2Bt2—13 to 21 inches; dark brown (7.5YR 4/4) sandy clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; firm; common fine roots; common fine pores; thin continuous dark brown (7.5YR 3/4) clay films on faces of peds; 2 percent gravel; very strongly acid; clear smooth boundary.

2Bt3—21 to 30 inches; dark yellowish brown (10YR 4/4) sandy clay loam; moderate medium subangular blocky structure; firm; few fine roots; common fine pores; thin discontinuous dark brown (7.5YR 4/4) clay films on faces of peds; 2 percent gravel; very strongly acid; clear smooth boundary.

2Bt4—30 to 41 inches; dark yellowish brown (10YR 4/4) sandy clay loam; moderate medium subangular blocky structure; firm; few fine roots; common fine pores; thin discontinuous dark brown (7.5YR 4/4) clay films on faces of peds; 10 percent gravel; strongly acid; clear smooth boundary.

2Bt5—41 to 51 inches; dark yellowish brown (10YR 4/4) sandy clay loam; weak coarse subangular blocky structure; firm; common fine pores; thin discontinuous dark brown (7.5YR 4/4) clay films on faces of peds; 5 percent gravel; neutral; clear smooth boundary.

2C—51 to 60 inches; yellowish brown (10YR 5/4) fine sandy loam; moderate thick platy till structure; friable; 10 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the silty material ranges from 0 to 20 inches. The depth to the 2C horizon ranges from 40 to 55 inches.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 or 3.

The Bt horizon has hue of 7.5YR or 10YR, value of 4, and chroma of 3 to 6. It is silty clay loam or clay loam. Reaction ranges from very strongly acid to neutral.

The 2Bt horizon has hue of 7.5YR or 10YR, value of 4, and chroma of 4 to 6. It is sandy clay loam or clay loam. Reaction ranges from strongly acid to mildly alkaline.

The 2C horizon has hue of 10YR, value of 5, and chroma of 3 or 4.

Rockfield Series

The Rockfield series consists of moderately well drained soils on till plains. These soils are deep or very deep over compact glacial till. Permeability is moderate in the upper part of the solum, moderately slow in the lower part of the solum, and slow in the underlying material. The soils formed in silty material, in glaciofluvial material, and in the underlying glacial till. Slopes range from 1 to 3 percent.

Rockfield soils are similar to Throckmorton soils and are commonly adjacent to Fincastle, Mahalasville,

Miami, Starks, and Treaty soils. Throckmorton soils have a darker surface layer than the Rockfield soils. Fincastle and Starks soils have a grayer subsoil than the Rockfield soils. They are in drainageways and the more level areas. Mahalasville and Treaty soils have a dark surface layer and a gray subsoil. They are in depressions and drainageways. Miami soils do not have gray mottles in the subsoil and have a solum that is less than 40 inches thick. They are on rises and in the more sloping areas.

Typical pedon of Rockfield silt loam, 1 to 3 percent slopes, in a cultivated field; 910 feet east and 2,280 feet south of the northwest corner of sec. 4, T. 23 N., R. 5 W.

Ap—0 to 10 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; neutral; abrupt smooth boundary.

Bt1—10 to 17 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; firm; common very fine pores; thin continuous dark brown (10YR 4/3) clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2—17 to 25 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure; firm; common very fine pores; thin continuous dark brown (10YR 4/3) clay films on faces of peds; very strongly acid; clear smooth boundary.

2Bt3—25 to 32 inches; dark yellowish brown (10YR 4/4) clay loam; common medium distinct grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm; common very fine pores; thin continuous dark brown (10YR 4/3) clay films on faces of peds; common fine and medium black (N 2/0) iron and manganese oxide accumulations; strongly acid; clear smooth boundary.

2Bt4—32 to 38 inches; dark yellowish brown (10YR 4/4) clay loam; common medium distinct dark yellowish brown (10YR 4/6) and grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; firm; common very fine pores; thin continuous dark brown (10YR 4/3) clay films on faces of peds; common fine and medium black (N 2/0) iron and manganese oxide accumulations; strongly acid; clear smooth boundary.

2Bt5—38 to 46 inches; dark yellowish brown (10YR 4/4) clay loam; common medium distinct grayish brown (10YR 5/2) and dark yellowish brown (10YR 4/6) mottles; weak coarse subangular blocky structure; firm; common very fine pores; thin discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; common fine and medium black (N 2/0) iron and manganese oxide accumulations; 1 percent gravel; strongly acid; gradual wavy boundary.

3Bt6—46 to 57 inches; dark yellowish brown (10YR 4/4) clay loam; common medium distinct grayish brown (10YR 5/2) and dark yellowish brown (10YR 4/6) mottles; weak coarse subangular blocky structure; firm; common very fine pores; thin discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; common fine and medium black (N 2/0) iron and manganese oxide accumulations; 5 percent gravel; neutral; gradual wavy boundary.

3BCt—57 to 67 inches; light olive brown (2.5Y 5/4) loam; common medium prominent gray (10YR 5/1) and yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; firm; common very fine pores; thin discontinuous dark brown (7.5YR 4/2) clay films on faces of peds; 5 percent gravel; mildly alkaline; gradual wavy boundary.

3Cd—67 to 80 inches; light olive brown (2.5Y 5/4) loam; few medium prominent yellowish brown (10YR 5/8) mottles; weak medium and thick platy till structure; very firm; 5 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 50 to 70 inches. The thickness of the silty material ranges from 24 to 40 inches. Mottles with chroma of 2 or less are at a depth of 24 to 48 inches.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 or 3.

The Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. Reaction ranges from very strongly acid to medium acid.

The 2Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. It is clay loam, loam, or sandy loam. Reaction ranges from strongly acid to neutral.

The 3Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. It is clay loam or loam. Reaction is neutral or mildly alkaline.

The 3BCt horizon has hue of 2.5Y or 10YR, value of 4 or 5, and chroma of 4 to 6.

The 3Cd horizon has hue of 2.5Y or 10YR, value of 5, and chroma of 3 or 4.

Rodman Series

The Rodman series consists of excessively drained, very rapidly permeable soils on the lower part of steep breaks on glacial till plains, on steep kames, and on steep breaks on outwash plains and terraces. These soils are shallow over very gravelly coarse sand and coarse sand. They formed in loamy outwash over gravelly outwash. Slopes range from 12 to 60 percent.

The Rodman soils in this survey area are taxadjuncts because they have a calcareous surface soil. This

difference, however, does not affect the use or behavior of these soils. The soils are classified as sandy-skeletal, mixed, mesic Entic Hapludolls.

Rodman soils are commonly adjacent to Elston, Kalamazoo, and Strawn soils. Elston and Kalamazoo soils have a thicker solum than the Rodman soils and have more clay in the subsoil. They are on the upper part of terrace breaks. Strawn soils are moderately deep to glacial till, do not have a thick, dark surface layer, and have an argillic horizon. They are on the upper part of till plain breaks.

Typical pedon of Rodman gravelly sandy loam, in an area of Strawn-Rodman complex, 18 to 50 percent slopes, in a wooded area; 540 feet west and 2,070 feet north of the southeast corner of sec. 13, T. 23 N., R. 4 W.

A1—0 to 5 inches; very dark gray (10YR 3/1) gravelly sandy loam, dark gray (10YR 4/1) dry; moderate fine granular structure; friable; many fine roots; 18 percent fine gravel; slight effervescence; mildly alkaline; clear smooth boundary.

A2—5 to 11 inches; very dark grayish brown (10YR 3/2) gravelly coarse sandy loam, dark brown (10YR 4/3) dry; moderate fine granular structure; friable; common fine roots; 5 percent coarse gravel and 25 percent fine gravel; slight effervescence; mildly alkaline; clear smooth boundary.

AB—11 to 15 inches; dark brown (10YR 3/3) gravelly loamy coarse sand, brown (10YR 5/3) dry; moderate fine granular structure; very friable; common fine roots; 5 percent coarse gravel and 28 percent fine gravel; strong effervescence; mildly alkaline; clear smooth boundary.

C—15 to 60 inches; brown (10YR 5/3) very gravelly coarse sand that has strata of coarse sand; single grained; loose; 10 percent coarse gravel and 45 percent fine gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 10 to 15 inches.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is gravelly loam, gravelly sandy loam, or gravelly coarse sandy loam.

The C horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is commonly stratified coarse sand, gravelly coarse sand, very gravelly coarse sand, or extremely gravelly coarse sand.

Ross Series

The Ross series consists of very deep, well drained, moderately permeable soils on flood plains. These soils formed in loamy alluvium. Slopes range from 0 to 2 percent.

Ross soils are similar to Du Page soils and are commonly adjacent to Allison and Battleground soils. Du Page soils are calcareous throughout the solum. Allison and Battleground soils are at the slightly lower elevations. They have less sand in the upper part of the subsoil than the Ross soils. Also, Battleground soils have a dark surface layer less than 24 inches thick.

Typical pedon of Ross silt loam, protected, in a cultivated field; 890 feet east and 1,920 feet south of the northwest corner of sec. 2, T. 24 N., R. 3 W.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak medium granular structure; friable; many very fine roots; 2 percent gravel; mildly alkaline; abrupt smooth boundary.

A—10 to 17 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; friable; common very fine roots; common very fine pores; mildly alkaline; gradual wavy boundary.

Bw1—17 to 23 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; moderate medium subangular blocky structure; friable; common very fine roots; common very fine pores; mildly alkaline; gradual wavy boundary.

Bw2—23 to 32 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure; friable; common very fine pores; mildly alkaline; gradual wavy boundary.

Bw3—32 to 39 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure; friable; common very fine pores; mildly alkaline; gradual wavy boundary.

Bw4—39 to 51 inches; brown (10YR 4/3) sandy loam; moderate medium subangular blocky structure; friable; thin continuous very dark grayish brown (10YR 3/2) organic stains on faces of peds; mildly alkaline; clear wavy boundary.

Bw5—51 to 80 inches; brown (10YR 4/3) sandy loam; weak coarse subangular blocky structure; friable; thin continuous dark brown (10YR 3/3) organic stains on faces of peds; mildly alkaline.

The solum is more than 80 inches thick. The thickness of the mollic epipedon ranges from 24 to 45 inches.

The Ap horizon has hue of 10YR, value of 3, and chroma of 1 or 2.

The Bw horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4. It is loam, sandy loam, or silty

clay loam. Reaction ranges from slightly acid to moderately alkaline.

Saranac Series

The Saranac series consists of very poorly drained soils on flood plains. These soils are deep over gravelly loamy coarse sand. Permeability is moderately slow in the solum and rapid in the underlying material. The soils formed in clayey and silty alluvium overlying gravelly material. Slopes range from 0 to 2 percent.

Saranac soils are commonly adjacent to Ceresco and Cohoctah soils. Ceresco and Cohoctah soils have less clay in the subsoil than the Saranac soils. Also, Ceresco soils have a browner subsoil. Ceresco and Cohoctah soils are on the narrower flood plains.

Typical pedon of Saranac silty clay, gravelly substratum, occasionally flooded, in a cultivated field; 1,850 feet east and 2,080 feet south of the northwest corner of sec. 23, T. 22 N., R. 4 W.

Ap—0 to 10 inches; black (10YR 2/1) silty clay, very dark grayish brown (10YR 3/2) dry; moderate medium granular structure; firm; slightly acid; abrupt smooth boundary.

A—10 to 18 inches; black (10YR 2/1) silty clay, very dark grayish brown (10YR 3/2) dry; moderate fine subangular blocky structure; firm; neutral; clear smooth boundary.

Bg1—18 to 28 inches; dark gray (N 4/0) silty clay; few fine distinct gray (5Y 5/1) mottles; weak coarse prismatic structure parting to weak coarse subangular blocky; very firm; thin continuous black (10YR 2/1) organic coatings on faces of peds; few fine pores; neutral; gradual smooth boundary.

Bg2—28 to 39 inches; gray (5Y 5/1) silty clay; few fine distinct grayish brown (2.5Y 5/2) mottles; moderate coarse prismatic structure; very firm; common fine pores; thin discontinuous very dark gray (10YR 3/1) organic coatings on faces of peds and lining pores; krotovinas 2 inches in diameter filled with very dark gray (N 3/0) silty clay material; neutral; clear smooth boundary.

Bg3—39 to 49 inches; grayish brown (2.5Y 5/2) silty clay loam; common medium distinct dark grayish brown (10YR 4/2) mottles; weak coarse prismatic structure; firm; few fine pores; thin discontinuous very dark gray (10YR 3/1) organic coatings on faces of peds and lining pores; krotovinas 2 inches in diameter filled with very dark gray (N 3/0) silty clay material; neutral; gradual wavy boundary.

Cg1—49 to 58 inches; dark gray (N 4/0) silt loam; many coarse prominent light olive brown (2.5YR 5/4) mottles; massive; friable; few fine pores; krotovinas 2 inches in diameter filled with very dark gray (N 3/0) silty clay material; 1 percent gravel; slight effervescence; neutral; clear wavy boundary.

Cg2—58 to 70 inches; light brownish gray (10YR 6/2) gravelly loamy coarse sand that has strata of silt loam and gravelly loam; single grained; loose; 25 percent gravel; strong effervescence; mildly alkaline.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the mollic epipedon ranges from 10 to 23 inches.

The Bg horizon has hue of 10YR, 2.5Y, or 5Y or is neutral in hue. It has value of 4 or 5 and chroma of 0 to 2.

The Cg horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. It is silt loam, silty clay loam, or clay loam in the upper part and gravelly loamy coarse sand in the lower part.

Sawabash Series

The Sawabash series consists of very deep, very poorly drained, moderately permeable soils on flood plains. These soils formed in silty alluvium. Slopes range from 0 to 2 percent.

Sawabash soils are commonly adjacent to Battleground and Tice soils. Battleground and Tice soils are in the higher lying areas. Battleground soils have a brown subsoil that does not have mottles. Tice soils have a browner subsoil than the Sawabash soils.

Typical pedon of Sawabash silty clay loam, frequently flooded, in a cultivated field; 2,240 feet west and 660 feet north of the southeast corner of sec. 25, T. 4 N., R. 4 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silty clay loam, brown (10YR 5/3) dry; moderate medium granular structure; friable; strong effervescence; mildly alkaline; abrupt smooth boundary.

A1—9 to 18 inches; very dark grayish brown (2.5Y 3/2) silty clay loam, brown (10YR 5/3) dry; weak medium prismatic structure parting to moderate medium subangular blocky; friable; common very fine and fine pores; thin discontinuous red (2.5YR 4/6) iron and manganese oxide stains on faces of peds and in pores; strong effervescence; mildly alkaline; gradual smooth boundary.

A2—18 to 36 inches; very dark gray (10YR 3/1) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate fine subangular blocky structure; firm; common very fine and fine pores; thin discontinuous red (2.5YR 4/6) iron and manganese oxide stains on faces of peds and in pores; strong

effervescence; mildly alkaline; gradual smooth boundary.

A3—36 to 46 inches; very dark gray (N 3/0) silty clay loam, dark grayish brown (10YR 4/2) dry; few medium prominent dark grayish brown (10YR 4/2) mottles; weak medium subangular blocky structure; firm; common very fine pores; slight effervescence; mildly alkaline; clear smooth boundary.

Bg—46 to 55 inches; dark grayish brown (2.5Y 4/2) silty clay loam; few medium distinct olive brown (2.5Y 4/4) mottles; weak coarse subangular blocky structure; firm; slight effervescence; mildly alkaline; clear smooth boundary.

Cg—55 to 60 inches; dark gray (10YR 4/1) silty clay loam; common medium distinct dark brown (10YR 4/3) mottles; massive; firm; slight effervescence; mildly alkaline.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the mollic epipedon ranges from 24 to 48 inches.

The Ap and A horizons have hue of 2.5Y or 10YR or are neutral in hue. They have value of 2 or 3 and chroma of 0 to 2.

The Bg and Cg horizons have hue of 10YR or 2.5Y, value of 4, and chroma of 1 or 2.

Shadeland Series

The Shadeland series consists of moderately deep, somewhat poorly drained soils on uplands. Permeability is moderate in the upper part of the solum and moderately slow in the lower part. These soils formed in silty material, loamy glacial drift, and residuum derived from the underlying interbedded siltstone and shale bedrock. Slopes range from 1 to 4 percent.

Shadeland soils are commonly adjacent to High Gap Variant soils and to the Mahalasville soils that have a shale substratum. High Gap Variant soils are not mottled in the upper part of the subsoil. They are on slight rises and in the more sloping areas along drainageways. Mahalasville soils have a dark surface layer and a gray subsoil. They are in depressions and drainageways.

Typical pedon of Shadeland silt loam, 1 to 4 percent slopes, in a cultivated field; 880 feet west and 80 feet south of the center of sec. 22, T. 22 N., R. 6 W.

Ap—0 to 8 inches; dark brown (10YR 4/3) silt loam, light brownish gray (10YR 6/2) dry; moderate medium granular structure; friable; many very fine roots; neutral; abrupt smooth boundary.

Bt1—8 to 12 inches; brown (10YR 5/3) silt loam; common medium faint light brownish gray (10YR 6/2) and distinct yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; friable; common very fine roots; many very fine pores; thin continuous grayish brown (10YR 5/2) clay films on faces of peds; very strongly acid; clear wavy boundary.

Bt2—12 to 16 inches; brown (10YR 5/3) silty clay loam; common medium faint light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm; common very fine roots; many very fine pores; thin continuous grayish brown (10YR 5/2) clay films on faces of peds; very strongly acid; clear wavy boundary.

2Bt3—16 to 27 inches; brown (10YR 5/3) clay loam; common medium faint light brownish gray (10YR 6/2) and distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; few very fine roots; common very fine pores; thin discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; 5 percent gravel; very strongly acid; clear wavy boundary.

3Bt4—27 to 31 inches; dark brown (7.5YR 4/4) clay loam; common medium prominent distinct light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm; few very fine roots; common very fine pores; thin continuous very dark grayish brown (10YR 3/2) clay films on faces of peds; common medium black (N 2/0) iron and manganese oxide accumulations; 12 percent channers; slightly acid; clear wavy boundary.

3BCt—31 to 34 inches; strong brown (7.5YR 5/6) channery clay loam; common distinct medium brown (7.5YR 5/2) mottles; weak thick platy structure; firm; thin discontinuous very dark grayish brown (10YR 3/2) clay films on faces of peds; common medium black (N 2/0) iron and manganese oxide accumulations; 25 percent channers; slightly acid; abrupt irregular boundary.

3Cr—34 to 60 inches; weathered interbedded siltstone and shale.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 or 3.

The Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 6. Reaction ranges from very strongly acid to medium acid.

The 2Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 1 to 6. Reaction ranges from very strongly acid to medium acid.

The 3Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 6. Reaction ranges from strongly acid to slightly acid.

The 3BCt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 6.

Sleeth Series

The Sleeth series consists of somewhat poorly drained soils on terraces and outwash plains. These soils are deep over gravelly sand. Permeability is moderate in the solum and very rapid in the underlying material. The soils formed in loamy and gravelly outwash. Slopes range from 0 to 2 percent.

Sleeth soils are commonly adjacent to Kalamazoo soils and to the Mahalasville soils that have a gravelly substratum. Kalamazoo soils have a brown subsoil. They are on rises and in the more sloping areas. Mahalasville soils have a dark surface layer and a gray subsoil. They are in depressional areas.

Typical pedon of Sleeth loam, 0 to 2 percent slopes, in a cultivated field; 2,340 feet west and 1,740 feet south of the northeast corner of sec. 29, T. 22 N., R. 4 W.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; many fine and very fine roots; strongly acid; abrupt smooth boundary.

Bt1—10 to 16 inches; brown (10YR 5/3) loam; common medium faint grayish brown (10YR 5/2) mottles; weak fine subangular blocky structure; firm; common very fine roots; common very fine pores; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2—16 to 30 inches; dark yellowish brown (10YR 4/4) loam; common medium distinct grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm; common very fine roots; common very fine pores; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; 5 percent gravel; medium acid; gradual smooth boundary.

Btg1—30 to 47 inches; gray (10YR 5/1) sandy clay loam; common medium prominent strong brown (7.5YR 4/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; common very fine pores; thin continuous dark gray (10YR 4/1) clay films on faces of peds; 5 percent gravel; slightly acid; gradual wavy boundary.

2Btg2—47 to 54 inches; dark gray (10YR 4/1) gravelly sandy loam; common medium prominent strong brown (7.5YR 4/6) mottles; weak coarse subangular blocky structure; friable; common very fine pores; thin continuous dark gray (10YR 4/1) clay films on faces of peds; 20 percent gravel; neutral; clear wavy boundary.

2BCtg—54 to 58 inches; dark grayish brown (10YR 4/2) gravelly loamy sand; common medium prominent strong brown (7.5YR 4/6) mottles; weak coarse subangular blocky structure; very friable; thin discontinuous dark gray (10YR 4/1) clay films on faces of peds; 20 percent gravel; neutral; clear wavy boundary.

2C—58 to 70 inches; yellowish brown (10YR 5/4) gravelly sand; common medium distinct grayish brown (10YR 5/2) mottles; single grained; loose; 25 percent gravel; strong effervescence; mildly alkaline.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the silty material ranges from 0 to 20 inches.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 or 3. It is loam or silt loam.

The Bt horizon is mottled. It has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. It is loam, sandy clay loam, or clay loam. Reaction ranges from strongly acid to slightly acid.

The 2Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 1 to 4. It is gravelly sandy clay loam or gravelly sandy loam. Reaction is neutral or mildly alkaline.

The 3C horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2. It is stratified sand and gravelly sand.

Sloan Series

The Sloan series consists of very deep, very poorly drained, moderately permeable soils on flood plains. These soils formed in loamy alluvium. Slopes range from 0 to 2 percent.

Sloan soils are commonly adjacent to Cohoctah soils. Cohoctah soils have less clay in the subsoil than the Sloan soils and have more gravel in the underlying material. They are in the wider areas on flood plains.

Typical pedon of Sloan clay loam, occasionally flooded, in a cultivated field; 480 feet south and 480 feet west of the center of sec. 20, T. 21 N., R. 4 W.

Ap—0 to 9 inches; black (10YR 2/1) clay loam, very dark gray (10YR 3/1) dry; moderate fine subangular blocky structure; firm; common fine pores; slightly acid; abrupt smooth boundary.

A—9 to 16 inches; black (10YR 2/1) clay loam, very dark gray (10YR 3/1) dry; few fine distinct dark yellowish brown (10YR 4/3) mottles; weak fine subangular blocky structure; firm; common fine pores; slightly acid; clear smooth boundary.

Bg1—16 to 24 inches; grayish brown (2.5Y 5/2) loam; common medium prominent yellowish brown (10YR

5/6) mottles; weak fine subangular blocky structure; firm; few fine pores; thin continuous dark gray (10YR 4/1) and thin patchy gray (N 5/0) organic coatings on faces of peds; neutral; gradual smooth boundary.

Bg2—24 to 32 inches; grayish brown (2.5Y 5/2) loam; common medium prominent yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; firm; common fine pores; thin discontinuous gray (N 5/0) organic coatings on faces of peds; black (10YR 2/1) clay loam fillings in krotovinas; neutral; clear smooth boundary.

Bg3—32 to 44 inches; grayish brown (2.5Y 5/2) loam that has thin strata of sandy loam; common medium prominent strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; firm; few fine pores; thin discontinuous gray (N 5/0) organic coatings on faces of peds; black (10YR 2/1) clay loam fillings in krotovinas; neutral; gradual wavy boundary.

Cg1—44 to 48 inches; grayish brown (10YR 5/2) sandy loam; few fine distinct yellowish brown (10YR 5/6) mottles; massive; friable; 10 percent gravel; mildly alkaline; clear wavy boundary.

Cg2—48 to 60 inches; grayish brown (10YR 5/2) gravelly loam; massive; friable; 20 percent gravel; slight effervescence; moderately alkaline.

The thickness of the solum ranges from 30 to 55 inches. The thickness of the mollic epipedon ranges from 10 to 24 inches.

The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is clay loam, silty clay loam, or loam.

The Bg horizon has hue of 10YR or 2.5Y or is neutral in hue. It has value of 4 or 5 and chroma of 0 to 2. It is clay loam or loam. Reaction ranges from slightly acid to moderately alkaline.

The Cg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. It is stratified loam or sandy loam or the gravelly analogs of these textures.

Sloan Variant

The Sloan Variant consists of moderately deep, very poorly drained, moderately permeable soils on flood plains. These soils formed in alluvium overlying interbedded siltstone and shale bedrock. Slopes range from 0 to 2 percent.

Sloan Variant soils are commonly adjacent to Sawabash and Tice soils. These soils are in the slightly lower positions on the landscape. Sawabash soils have less sand in the subsoil than the Sloan Variant soils and have a thicker solum. Tice soils have a browner subsoil than the Sloan Variant soils. Also, they have less sand in the subsoil and have a thicker solum.

Typical pedon of Sloan Variant silty clay loam, occasionally flooded, in a cultivated field; 950 feet east and 380 feet north of the southwest corner of sec. 10, T. 22 N., R. 6 W.

Ap—0 to 10 inches; black (10YR 2/1) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; firm; many fine roots; 2 percent gravel; moderately alkaline; abrupt smooth boundary.

BA—10 to 17 inches; black (10YR 2/1) silty clay loam, dark grayish brown (10YR 4/2) dry; common medium prominent dark brown (7.5YR 4/4) mottles; moderate fine subangular blocky structure; firm; common fine roots; few very fine pores; 5 percent gravel; moderately alkaline; clear smooth boundary.

2Btg1—17 to 26 inches; dark grayish brown (10YR 4/2) very channery sandy clay loam; common medium prominent strong brown (7.5YR 4/6) mottles; moderate fine subangular blocky structure; firm; common fine roots; many very fine pores; thin discontinuous dark gray (10YR 4/1) clay films on faces of peds; 35 percent channers; moderately alkaline; clear smooth boundary.

2Btg2—26 to 33 inches; dark grayish brown (10YR 4/2) very channery sandy clay loam; common medium prominent strong brown (7.5YR 4/6) mottles; weak fine subangular blocky structure; firm; few fine roots; many very fine pores; thin discontinuous dark gray (10YR 4/1) clay films on faces of peds; 55 percent channers; moderately alkaline; clear smooth boundary.

3Cr—33 inches; weathered interbedded siltstone and shale.

The solum ranges from 20 to 40 inches in thickness. It is mildly alkaline or moderately alkaline.

The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1.

The Btg horizon is mottled. It has hue of 2.5Y or 10YR, value of 4 or 5, and chroma of 1 or 2.

Sparta Series

The Sparta series consists of very deep, excessively drained, rapidly permeable soils on sand dunes. These soils formed in eolian sandy sediments. Slopes range from 2 to 12 percent.

The Sparta soils in this survey area are taxadjuncts because they have a low base saturation in the surface layer and thin bands of loamy sand above a depth of 60 inches. These differences, however, do not affect the

use or behavior of these soils. The soils are classified as mixed, mesic Alfic Udipsamments.

Sparta soils are similar to Coloma, Oakville, and Spinks soils and are commonly adjacent to Carmi and Elston soils and to the Billett soils that have a gravelly substratum. Coloma, Oakville, and Spinks soils have a lighter colored surface layer than the Sparta soils. Also, Oakville soils do not have bands in the subsoil and have finer textured sand. Billett, Carmi, and Elston soils have more clay in the upper part of the subsoil than the Sparta soils. They are at the lower elevations.

Typical pedon of Sparta sand, 2 to 6 percent slopes, in a cultivated field; 135 feet west and 150 feet south of the northeast corner of sec. 35, T. 23 N., R. 6 W.

Ap—0 to 12 inches; very dark brown (10YR 2/2) sand, dark grayish brown (10YR 4/2) dry; weak fine granular structure; very friable; many very fine roots; strongly acid; abrupt smooth boundary.

A—12 to 19 inches; very dark brown (10YR 2/2) sand, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; very friable; common very fine roots; strongly acid; gradual smooth boundary.

E1—19 to 29 inches; dark brown (10YR 4/3) sand; weak medium granular structure; very friable; few very fine roots; strongly acid; gradual smooth boundary.

E2—29 to 41 inches; dark yellowish brown (10YR 4/4) sand; weak medium subangular blocky structure; very friable; few very fine roots; strongly acid; gradual smooth boundary.

E3—41 to 48 inches; yellowish brown (10YR 5/4) sand; weak medium subangular blocky structure; very friable; few very fine roots; strongly acid; gradual wavy boundary.

E&Bt—48 to 80 inches; brown (7.5YR 5/4) sand (E); weak medium subangular blocky structure; very friable; bands of dark brown (7.5YR 4/4) loamy sand (Bt) at depths of 48, 51, 53, 57, 60, 62, 64, 67, 70, 72, 75, and 78 inches; massive; very friable; bands are ⅛ to ⅜ inch thick, are discontinuous, and have a cumulative thickness of 1 inch within a depth of 60 inches; weak clay bridges connect sand grains in bands; strongly acid.

The Ap and A horizons have hue of 10YR, value of 2 or 3, and chroma of 1 or 2.

The E horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. Reaction ranges from strongly acid to medium acid.

The E part of the E&Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. The E&Bt horizon is strongly acid or medium acid.

Spinks Series

The Spinks series consists of very deep, well drained soils on outwash plains, terraces, till plains, and recessional moraines. These soils formed in sandy sediments. Permeability is rapid in the upper part of the solum, moderately rapid in the lower part of the solum, and rapid in the underlying material. Slopes range from 2 to 12 percent.

Spinks soils are similar to Coloma, Oakville, and Sparta soils and are commonly adjacent to Alvin, Mahalasville, Treaty, and Whitaker soils. Coloma and Sparta soils have bands in the subsoil that are less than 6 inches thick and have coarser sand than the Spinks soils. Oakville soils do not have bands in the subsoil. Alvin soils have more clay in the upper part of the subsoil than the Spinks soils. They are at the lower elevations. Mahalasville and Treaty soils have a dark surface layer and a gray subsoil. They are in depressions and on toe slopes. Whitaker soils have gray mottles in the subsoil. They are on toe slopes.

Typical pedon of Spinks fine sand, 6 to 12 percent slopes, in an idle field; 1,650 feet east and 1,980 feet north of the southwest corner of sec. 14, T. 22 N., R. 5 W.

Ap—0 to 9 inches; dark brown (10YR 3/3) fine sand, pale brown (10YR 6/3) dry; weak fine granular structure; very friable; common very fine roots; medium acid; abrupt smooth boundary.

E—9 to 21 inches; dark yellowish brown (10YR 4/4) fine sand; weak fine subangular blocky structure; very friable; common very fine roots; medium acid; gradual wavy boundary.

E&Bt—21 to 68 inches; dark yellowish brown (10YR 4/4) fine sand (E); weak fine subangular blocky structure; very friable; bands of dark brown (7.5YR 4/4) loamy fine sand (Bt); massive; very friable; bands are ⅛ inch to 3 inches thick and have a cumulative thickness of more than 6 inches within a depth of 60 inches; weak clay bridges connect sand grains in bands; neutral; gradual wavy boundary.

C—68 to 80 inches; brown (10YR 5/3) fine sand; single grained; loose; strong effervescence; moderately alkaline.

The solum is more than 60 inches thick.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 3. It is fine sand or sand.

The E horizon has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. It is fine sand or sand. Reaction ranges from medium acid to neutral.

The E part of the E&Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. The Bt part has hue of 7.5YR, value of 4 or 5, and chroma of 4. The

E&Bt horizon ranges from medium acid to mildly alkaline.

The C horizon has hue of 10YR, value of 5, and chroma of 3 or 4. It is fine sand or sand.

Starks Series

The Starks series consists of very deep, somewhat poorly drained, moderately permeable soils on till plains. These soils formed in silty material and in the underlying glaciofluvial deposits. Slopes range from 0 to 2 percent.

Starks soils are similar to Millbrook soils and are commonly adjacent to Crosby, Fincastle, Mahalasville, Rockfield, and Treaty soils. Millbrook soils have a darker surface layer than the Starks soils. Crosby and Fincastle soils are underlain by glacial till. They are at the slightly higher elevations. Mahalasville and Treaty soils have a dark surface layer and a gray subsoil. They are in the lower positions on the landscape. Rockfield soils do not have gray mottles in the upper part of the subsoil. They are underlain by glacial till. They are on slight rises and in the more sloping areas adjacent to drainageways.

Typical pedon of Starks silt loam (fig. 18), in an area of Starks-Fincastle complex, 0 to 2 percent slopes, in a cultivated field; 910 feet east and 900 feet north of the southwest corner of sec. 14, T. 23 N., R. 3 W.

Ap—0 to 10 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak medium granular structure; friable; common fine roots; strongly acid; abrupt wavy boundary.

Bt1—10 to 20 inches; brown (10YR 5/3) silty clay loam; common fine faint grayish brown (10YR 5/2) and distinct yellowish brown (10YR 5/6) mottles; weak fine prismatic structure parting to moderate medium and fine subangular blocky; firm; common fine roots; common fine pores; thin continuous grayish brown (10YR 5/2) clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2—20 to 27 inches; brown (10YR 5/3) silty clay loam; common medium faint grayish brown (10YR 5/2) and distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; common fine roots; common fine pores; thin discontinuous grayish brown (10YR 5/2) clay films on faces of peds; few very dark grayish brown (10YR 4/2) clay linings in pores; slightly acid; clear smooth boundary.

Bt3—27 to 33 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/8) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; common fine roots; common fine pores; thin discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; slightly acid; clear smooth boundary.

Figure 18.—Profile of Starks silt loam. Stratified glaciofluvial material is at a depth of about 4 feet. Depth is marked in feet.

Bt4—33 to 38 inches; yellowish brown (10YR 5/4) silty

clay loam; common medium distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to weak medium subangular blocky; firm; common fine roots; common fine pores; thin discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; slightly acid; clear smooth boundary.

2Bt5—38 to 46 inches; yellowish brown (10YR 5/4) silt loam that has pockets of loam and sandy loam; common medium distinct light brownish gray (10YR 6/2) and yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; firm; few fine roots; common fine pores; thin patchy grayish brown (10YR 5/2) clay films on faces of peds; 3 percent fine gravel; neutral; clear smooth boundary.

2Bt6—46 to 56 inches; yellowish brown (10YR 5/6) loam; common medium distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; firm; few fine roots; common fine pores; thin patchy very dark grayish brown (10YR 3/2) clay films on faces of peds; neutral; clear wavy boundary.

2C—56 to 70 inches; yellowish brown (10YR 5/4) sandy loam that has thin strata of loamy sand and several pockets of silt loam; common medium distinct grayish brown (10YR 5/2) mottles; firm; massive; 10 percent gravel; strong effervescence; mildly alkaline.

The thickness of the solum ranges from 40 to 70 inches. The thickness of the silty material ranges from 24 to 40 inches.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3.

The Bt horizon is mottled. It has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. Reaction ranges from strongly acid to slightly acid.

The 2Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 6. It is silt loam, silty clay loam, loam, sandy loam, sandy clay loam, or clay loam. Reaction ranges from strongly acid to mildly alkaline.

The 2C horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 6. The texture dominantly ranges from sandy loam to silt loam. Strata of sand, loamy sand, or loamy fine sand are in all pedons.

Strawn Series

The Strawn series consists of well drained soils on steep breaks on till plains. These soils are shallow or moderately deep over compact glacial till. Permeability is moderate in the solum and moderately slow in the underlying material. The soils formed in loamy glacial till. Slopes range from 18 to 50 percent.

Strawn soils are similar to Miami and Octagon soils and are adjacent to Rodman soils. Miami and Octagon soils have a thicker solum than the Strawn soils. Also, Octagon soils have a darker surface layer. Rodman soils have a dark surface layer and have more sand and gravel in the subsoil than the Strawn soils. They are underlain by sand and gravel. They are on the lower part of steep breaks on till plains.

Typical pedon of Strawn loam, in an area of Strawn-Rodman complex, 18 to 50 percent slopes, in a wooded area; 620 feet west and 2,100 feet north of the southeast corner of sec. 13, T. 23 N., R. 3 W.

A—0 to 3 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; many medium roots; neutral; clear smooth boundary.

E—3 to 9 inches; brown (10YR 4/3) loam; weak fine subangular blocky structure parting to moderate medium granular; friable; many medium roots; many fine pores; thin discontinuous very dark grayish brown (10YR 3/2) organic stains on faces of peds and in pores; strongly acid; clear smooth boundary.

Bt—9 to 16 inches; dark yellowish brown (10YR 4/4) loam; moderate medium subangular blocky structure; firm; common medium roots; common fine pores; thin continuous dark yellowish brown (10YR 3/4) clay films on faces of peds; 4 percent gravel; neutral; clear wavy boundary.

Cd—16 to 60 inches; yellowish brown (10YR 5/4) loam; moderate thick platy till structure; very firm; 5 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 10 to 24 inches.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2. It is silt loam or loam.

The E horizon, if it occurs, has hue of 10YR, value of 4 or 5, and chroma of 3. It is silt loam or loam.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is loam or clay loam. Reaction ranges from medium acid to mildly alkaline.

The C horizon has hue of 10YR or 2.5Y, value of 5, and chroma of 3 or 4.

Tecumseh Series

The Tecumseh series consists of very deep, well drained, moderately permeable soils on till plains. These soils formed in silty material and in the underlying glaciofluvial material and glacial till. Slopes range from 0 to 2 percent.

Tecumseh soils are similar to Mellott soils and are commonly adjacent to Lauramie soils. Mellott soils have a dark surface layer less than 10 inches thick. Lauramie

soils have more sand in the upper part of the subsoil than the Tecumseh soils. They are in the more sloping areas on rises and along drainageways.

Typical pedon of Tecumseh silt loam, 0 to 2 percent slopes, in a cultivated field; 375 feet east and 2,500 feet north of the southwest corner of sec. 21, T. 22 N., R. 4 W.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; moderate medium granular structure; friable; medium acid; abrupt smooth boundary.

A—10 to 15 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; moderate medium granular structure; friable; common very fine pores; medium acid; clear smooth boundary.

Bt1—15 to 21 inches; dark yellowish brown (10YR 3/4) silty clay loam; moderate medium subangular blocky structure; firm; many very fine pores; thin continuous very dark grayish brown (10YR 3/2) organic coatings and clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2—21 to 30 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure; firm; many very fine pores; thin continuous dark brown (10YR 3/3) clay films on faces of peds; strongly acid; clear smooth boundary.

2Bt3—30 to 35 inches; dark brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; firm; many very fine pores; thin continuous dark brown (10YR 3/3) clay films on faces of peds; 1 percent gravel; medium acid; clear smooth boundary.

2Bt4—35 to 40 inches; dark brown (7.5YR 4/4) sandy clay loam; moderate medium subangular blocky structure; firm; many very fine pores; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; 1 percent gravel; strongly acid; clear smooth boundary.

2Bt5—40 to 48 inches; dark brown (7.5YR 4/4) fine sandy loam; moderate coarse subangular blocky structure; firm; many very fine pores; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; 1 percent gravel; strongly acid; clear smooth boundary.

3Bt6—48 to 57 inches; dark yellowish brown (10YR 4/4) loam; moderate coarse subangular blocky structure; firm; common very fine pores; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; 5 percent gravel; slightly acid; clear smooth boundary.

3Bt7—57 to 65 inches; yellowish brown (10YR 5/4) loam; weak coarse subangular blocky structure; firm; thin discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; 5 percent gravel; neutral; clear wavy boundary.

3BCt—65 to 75 inches; yellowish brown (10YR 5/4) loam; weak coarse subangular blocky structure; friable; thin discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; 5 percent gravel; slight effervescence; moderately alkaline; clear wavy boundary.

3C—75 to 80 inches; yellowish brown (10YR 5/4) fine sandy loam; massive; friable; 5 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 60 to 80 inches. The thickness of the silty material ranges from 24 to 40 inches. Depth to the 3Bt horizon ranges from 40 to 60 inches.

The Ap and A horizons have hue of 10YR, value of 3, and chroma of 1 or 2. The total combined thickness of the A horizons ranges from 10 to 18 inches.

The Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. Reaction ranges from very strongly acid to slightly acid.

The 2Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is clay loam, sandy clay loam, or fine sandy loam. Reaction ranges from strongly acid to slightly acid.

The 3Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. Reaction is slightly acid or neutral.

The 3C horizon has hue of 10YR, value of 5, and chroma of 3 or 4.

Thackery Series

The Thackery series consists of moderately well drained soils on terraces and outwash plains. These soils are deep over gravelly sand. Permeability is moderate in the upper part of the solum, moderately rapid in the lower part of the solum, and very rapid in the underlying material. The soils formed in silty material, in loamy outwash, and in the underlying gravelly outwash. Slopes range from 0 to 2 percent.

Thackery soils are commonly adjacent to Kalamazoo, Ockley, and Waynetown soils and to the Mahalasville soils that have a gravelly substratum. Kalamazoo and Ockley soils do not have gray mottles in the lower part of the subsoil. They are in the higher lying areas. Mahalasville soils have a dark surface layer and a dominantly gray subsoil. They are in depressional areas. Waynetown soils have gray mottles in the upper part of the subsoil. They are in the lower lying areas.

Typical pedon of Thackery silt loam, 0 to 2 percent slopes, in a cultivated field; 675 feet west and 910 feet south of the northeast corner of sec. 29, T. 22 N., R. 4 W.

Ap—0 to 10 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak medium granular structure; friable; many fine roots; medium acid; abrupt smooth boundary.

Bt1—10 to 16 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; firm; common very fine roots; common very fine pores; thin continuous dark brown (10YR 4/3) clay films on faces of peds; medium acid; clear smooth boundary.

2Bt2—16 to 24 inches; dark yellowish brown (10YR 4/4) clay loam; few fine distinct grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm; common very fine roots; common very fine pores; thin continuous dark brown (10YR 4/3) clay films on faces of peds; 5 percent gravel; medium acid; clear smooth boundary.

2Bt3—24 to 34 inches; dark yellowish brown (10YR 4/4) sandy clay loam; common medium distinct grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm; common very fine roots; common very fine pores; thin continuous dark brown (10YR 4/3) clay films on faces of peds; 5 percent gravel; medium acid; clear smooth boundary.

2Bt4—34 to 42 inches; dark yellowish brown (10YR 4/4) sandy clay loam; common medium distinct grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure; firm; few very fine roots; common very fine pores; thin continuous dark brown (7.5YR 4/2) clay films on faces of peds; 5 percent gravel; medium acid; clear smooth boundary.

2Bt5—42 to 48 inches; dark yellowish brown (10YR 4/4) sandy clay loam; common medium distinct gray (10YR 5/1) mottles; weak coarse subangular blocky structure; firm; common very fine pores; thin continuous dark brown (7.5YR 4/2) clay films on faces of peds; 11 percent gravel; slightly acid; clear smooth boundary.

3BCt—48 to 54 inches; dark brown (7.5YR 4/2) gravelly sandy loam; weak coarse subangular blocky structure; firm; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; 22 percent gravel; slight effervescence; mildly alkaline; clear wavy boundary.

3Cg—54 to 60 inches; grayish brown (10YR 5/2) gravelly sand; single grained; loose; 27 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 50 to 60 inches. The thickness of the silty material ranges from 0 to 20 inches.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 or 3.

The Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. It is silty clay loam or silt loam. Reaction ranges from strongly acid to slightly acid.

The 2Bt horizon has hue of 7.5YR or 10YR, value of 4, and chroma of 3 to 6. Reaction ranges from strongly acid to mildly alkaline.

The 3Cg horizon has hue of 10YR, value of 5 or 6, and chroma of 2. It is stratified. Textures include sand and gravelly sand.

Throckmorton Series

The Throckmorton series consists of moderately well drained soils on recessional moraines and till plains. These soils are deep over compact glacial till. Permeability is moderate in the upper part of the solum, moderately slow in the lower part of the solum, and slow in the underlying glacial till. The soils formed in silty material and in the underlying glaciofluvial material and glacial till. Slopes range from 1 to 3 percent.

Throckmorton soils are similar to Rockfield soils and are commonly adjacent to Drummer, Mellott, Millbrook, Octagon, and Toronto soils. Rockfield soils have a lighter colored surface layer than the Throckmorton soils. Drummer soils have a thicker surface layer than the Throckmorton soils and have a grayer subsoil. They are in depressions and drainageways. Mellott soils do not have mottles in the subsoil. They are at the slightly higher elevations. Millbrook and Toronto soils have gray mottles immediately below the surface layer. They are in the more level areas. Octagon soils have a brown subsoil that does not have mottles. They are in the more sloping areas along drainageways and on rises.

Typical pedon of Throckmorton silt loam, 1 to 3 percent slopes, in a cultivated field; 590 feet east and 200 feet north of the southwest corner of sec. 27, T. 22 N., R. 6 W.

Ap—0 to 9 inches; very dark gray (10YR 3/1) silt loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; friable; neutral; abrupt smooth boundary.

Bt1—9 to 12 inches; dark brown (10YR 4/3) silt loam; moderate fine subangular blocky structure; firm; common very fine pores; thin continuous dark brown (10YR 3/3) clay films and organic coatings on faces of peds; slightly acid; clear smooth boundary.

Bt2—12 to 22 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; firm; many very fine pores; thin continuous dark brown (10YR 3/3) clay films on faces of peds; thin discontinuous very dark grayish brown (10YR 3/2) organic coatings on faces of peds; strongly acid; clear smooth boundary.

Bt3—22 to 29 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure; firm; many very fine pores; thin continuous dark brown (10YR 4/3) clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt4—29 to 34 inches; yellowish brown (10YR 5/4) silty clay loam; few fine distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; firm; many very fine pores; thin continuous dark brown (10YR 4/3) clay films on faces of peds; very strongly acid; clear smooth boundary.

2Bt5—34 to 42 inches; dark yellowish brown (10YR 4/4) clay loam; common medium distinct grayish brown (10YR 5/2) mottles; moderate coarse subangular blocky structure; firm; many very fine pores; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; 1 percent gravel; very strongly acid; clear wavy boundary.

2Bt6—42 to 45 inches; dark brown (10YR 4/3) sandy loam; common medium distinct grayish brown (10YR 5/2) and dark yellowish brown (10YR 4/6) mottles; moderate coarse subangular blocky structure; firm; many very fine pores; thin discontinuous dark brown (10YR 3/3) clay films on faces of peds; common fine black (N 2/0) iron and manganese oxide accumulations; 12 percent gravel; medium acid; clear smooth boundary.

3Bt7—45 to 58 inches; brown (10YR 5/3) loam; common medium distinct light brownish gray (10YR 6/2) mottles; weak coarse subangular blocky structure; firm; common very fine pores; thin discontinuous dark brown (10YR 3/3) clay films on faces of peds; few fine black (N 2/0) iron and manganese oxide accumulations; 6 percent gravel; slightly acid; gradual wavy boundary.

3Cd—58 to 65 inches; yellowish brown (10YR 5/4) loam; common medium distinct light brownish gray (10YR 6/2) mottles; massive; very firm; 6 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the silty material ranges from 24 to 40 inches. Mottles with chroma of 2 or less are within a depth of about 24 to 40 inches.

The Ap horizon has hue of 10YR, value of 3, and chroma of 1 to 3.

The Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. Reaction ranges from very strongly acid to slightly acid.

The 2Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4. It is clay loam or sandy loam. Reaction ranges from very strongly acid to medium acid.

The 3Bt horizon has hue of 10YR, value of 5, and chroma of 3 or 4. Reaction is slightly acid or neutral.

The 3Cd horizon has hue of 10YR, value of 5, and chroma of 3 or 4.

Tice Series

The Tice series consists of very deep, somewhat poorly drained, moderately permeable soils on flood plains. These soils formed in silty alluvium. Slopes range from 0 to 2 percent.

The Tice soils in this survey area have more clay in the lower part of the surface soil and the upper part of the subsoil than is defined as the range for the series. This difference, however, does not affect the use or behavior of these soils. The soils are classified as fine, mixed, mesic Fluvaquentic Hapludolls.

Tice soils are commonly adjacent to Battleground and Sawabash soils. Battleground soils have a brown subsoil that is not mottled. They are at the higher elevations. Sawabash soils have a dominantly gray subsoil and have a surface layer that is more than 24 inches thick. They are in the lower lying areas.

Typical pedon of Tice silty clay loam, frequently flooded, in a cultivated field; 3,000 feet west and 500 feet north of the southeast corner of sec. 25, T. 24 N., R. 4 W.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) silty clay loam, brown (10YR 5/3) dry; moderate medium granular structure; firm; slight effervescence; mildly alkaline; abrupt smooth boundary.

A—10 to 14 inches; very dark grayish brown (10YR 3/2) silty clay loam, brown (10YR 5/3) dry; moderate very fine and fine subangular blocky structure; firm; common very fine pores; thin continuous very dark gray (10YR 3/1) organic coatings on faces of peds; mildly alkaline; clear smooth boundary.

Bw1—14 to 34 inches; dark brown (10YR 4/3) silty clay loam; common fine faint dark grayish brown (10YR 4/2) mottles; moderate fine subangular blocky structure; firm; common very fine pores; thin continuous dark gray (10YR 4/1) organic coatings on faces of peds; mildly alkaline; gradual smooth boundary.

Bw2—34 to 40 inches; dark brown (10YR 4/3) silty clay loam; common medium faint dark grayish brown (10YR 4/2) mottles; moderate fine subangular blocky structure; firm; common very fine pores; thin continuous dark gray (10YR 4/1) organic coatings on faces of peds; mildly alkaline; gradual smooth boundary.

Bw3—40 to 50 inches; dark brown (10YR 4/3) silty clay loam; common fine distinct dark gray (10YR 4/1) mottles; weak medium subangular blocky structure; firm; mildly alkaline; gradual smooth boundary.
C—50 to 60 inches; yellowish brown (10YR 5/4) loam; common fine distinct gray (10YR 5/1) mottles; massive; firm; mildly alkaline.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the mollic epipedon ranges from 10 to 20 inches.

The Ap horizon has hue of 10YR, value of 3, and chroma of 1 or 2.

The Bw horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. Reaction ranges from medium acid to mildly alkaline.

The C horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. It is loam or silty clay loam.

Toronto Series

The Toronto series consists of somewhat poorly drained soils on till plains and recessional moraines. These soils are deep over compact glacial till. Permeability is moderate in the upper part of the solum, moderately slow in the lower part of the solum, and slow in the underlying material. The soils formed in silty material and in the underlying glacial till. Slopes range from 0 to 6 percent.

The Toronto soils in this survey area contain more clay in the upper part of the subsoil than is defined as the range for the series. This difference, however, does not affect the use or behavior of these soils. The soils are classified as fine, mixed, mesic Udollic Ochraqualfs.

Toronto soils are similar to Fincastle and Raub soils and are commonly adjacent to Drummer, Millbrook, Octagon, and Throckmorton soils. Fincastle soils have a lighter colored surface layer than the Toronto soils. Raub soils have a dark surface layer 10 or more inches thick. Drummer and Millbrook soils are underlain by loamy outwash. Drummer soils have a thicker surface layer than the Toronto soils and have a grayer subsoil. They are in depressions and drainageways. Millbrook soils are at the slightly lower elevations. Octagon soils have a brown subsoil that is not mottled. They are in the more sloping areas along drainageways and on rises. Throckmorton soils have a browner subsoil than the Toronto soils. They are on slight rises.

Typical pedon of Toronto silt loam, in an area of Toronto-Millbrook complex, 0 to 2 percent slopes, in a cultivated field; 1,675 feet west and 230 feet north of the southeast corner of sec. 33, T. 22 N., R. 4 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; common fine and medium roots; neutral; abrupt smooth boundary.
Bt1—9 to 13 inches; dark brown (10YR 4/3) silty clay loam; common fine faint grayish brown (10YR 5/2) mottles; moderate fine subangular blocky structure; firm; common fine roots; common fine pores; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; thin patchy very dark grayish brown (10YR 3/2) organic coatings on faces of peds; strongly acid; clear smooth boundary.
Bt2—13 to 19 inches; dark yellowish brown (10YR 4/4) silty clay loam; common medium distinct dark grayish brown (10YR 4/2) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; common fine roots; common fine pores; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; few medium black (N 2/0) iron and manganese oxide accumulations; strongly acid; clear smooth boundary.
Bt3—19 to 27 inches; dark yellowish brown (10YR 4/4) silty clay; common medium distinct grayish brown (10YR 5/2) and dark yellowish brown (10YR 4/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; common fine roots; common fine pores; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; few medium black (N 2/0) iron and manganese oxide accumulations; strongly acid; clear smooth boundary.
2Bt4—27 to 32 inches; dark yellowish brown (10YR 4/6) clay loam; common medium distinct grayish brown (10YR 5/2) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; common fine pores; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; few medium black (N 2/0) iron and manganese oxide accumulations; 2 percent gravel; medium acid; clear smooth boundary.
2Bt5—32 to 40 inches; dark yellowish brown (10YR 4/6) clay loam; common medium distinct grayish brown (10YR 5/2) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; common fine pores; thin discontinuous dark grayish brown (10YR 4/2) and continuous very dark grayish brown (10YR 3/2) clay films on faces of peds; krotovinas 2 inches in diameter filled with very dark grayish brown (10YR 3/2) silty clay loam material; 3 percent gravel; slightly acid; clear smooth boundary.
2Bt6—40 to 46 inches; yellowish brown (10YR 5/4) loam; common medium distinct dark yellowish brown (10YR 4/6) and grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure;

firm; common fine grayish brown (10YR 5/2) clay films on faces of peds; krotovinas 2 inches in diameter filled with very dark grayish brown (10YR 3/2) silty clay loam material; 3 percent gravel; neutral; clear smooth boundary.

2BCt—46 to 52 inches; yellowish brown (10YR 5/4) loam; common medium distinct grayish brown (10YR 5/2) and dark yellowish brown (10YR 4/6) mottles; weak coarse subangular blocky structure; firm; common fine pores; thin discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; 10 percent gravel; slight effervescence; mildly alkaline; clear wavy boundary.

2Cd—52 to 60 inches; yellowish brown (10YR 5/4) loam; common coarse distinct light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) mottles; weak medium platy till structure; very firm; 5 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the silty material ranges from 22 to 40 inches.

The Ap horizon has hue of 10YR, value of 3, and chroma of 1 or 2.

The Bt horizon has hue of 2.5Y or 10YR, value of 4 or 5, and chroma of 3 or 4. It has mottles with chroma of 2 or less. It is dominantly silty clay loam, but the range includes silty clay. Reaction ranges from very strongly acid to medium acid.

The 2Bt horizon has hue of 2.5Y or 10YR, value of 4 or 5, and chroma of 3 to 6. Reaction ranges from medium acid to mildly alkaline.

The 2Cd horizon has hue of 2.5Y or 10YR, value of 5 or 6, and chroma of 3 or 4.

Treaty Series

The Treaty series consists of very poorly drained soils on till plains and recessional moraines. These soils are deep over compact glacial till. Permeability is moderate in the solum and moderately slow in the underlying material. The soils formed in silty material and in the underlying glacial till. Slopes range from 0 to 2 percent.

Treaty soils are similar to Chalmers soils and are commonly adjacent to Crosby, Fincastle, Mahalasville, and Starks soils. Chalmers soils do not have an argillic horizon. Crosby, Fincastle, and Starks soils have a light colored surface layer and have a browner subsoil than the Treaty soils. They are in the slightly higher positions on the landscape. Mahalasville soils are underlain by stratified sediments. They are in landscape positions similar to those of the Treaty soils.

Typical pedon of Treaty silty clay loam, in an area of Mahalasville-Treaty complex, in a cultivated field; 530 feet west and 1,190 feet south of the northeast corner of sec. 23, T. 22 N., R. 3 W.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; many fine roots; neutral; clear wavy boundary.

Btg1—10 to 15 inches; dark gray (10YR 4/1) silty clay loam; common fine prominent light olive brown (2.5Y 5/4) mottles; moderate fine subangular blocky structure; firm; common fine roots; common fine pores; thin continuous very dark gray (N 3/0) clay films on faces of peds; patchy thin black (10YR 2/1) organic stains on faces of peds; slightly acid; clear smooth boundary.

Btg2—15 to 21 inches; dark gray (10YR 4/1) silty clay loam; common medium prominent light olive brown (2.5Y 5/4) mottles; moderate fine and medium subangular blocky structure; firm; common fine roots; common fine pores; thin continuous very dark gray (5Y 3/1) clay films on faces of peds; neutral; clear smooth boundary.

Btg3—21 to 26 inches; grayish brown (2.5Y 5/2) silty clay loam; common medium distinct light olive brown (2.5Y 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; common fine roots; common fine pores; thin discontinuous dark gray (5Y 4/1) clay films on faces of peds; neutral; clear smooth boundary.

Btg4—26 to 37 inches; grayish brown (2.5Y 5/2) silt loam; many medium distinct light olive brown (2.5Y 5/6) mottles; weak medium and coarse prismatic structure parting to weak medium subangular blocky; firm; few fine roots; few fine pores; thin discontinuous dark gray (5Y 4/1) clay films on faces of peds; neutral; clear smooth boundary.

2Btg5—37 to 48 inches; grayish brown (2.5Y 5/2) loam; common medium prominent yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm; thin discontinuous dark grayish brown (2.5Y 4/2) clay films on faces of peds; 4 percent gravel; mildly alkaline; clear smooth boundary.

2Cd—48 to 60 inches; light olive brown (2.5Y 5/4) loam; common medium prominent yellowish brown (10YR 5/6) and gray (N 5/0) mottles; weak medium platy till structure; very firm; 5 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the silty material ranges from 24 to 40 inches.

The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2.

The Btg horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 1 or 2. Reaction ranges from slightly acid to mildly alkaline.

The 2Btg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. It is clay loam or loam. Reaction is neutral or mildly alkaline.

The 2Cd horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 or 4.

Troxel Series

The Troxel series consists of very deep, well drained, moderately permeable soils in depressions on outwash plains and terraces. These soils formed in silty and loamy material and in the underlying gravelly outwash. Slopes range from 0 to 2 percent.

The Troxel soils in this survey area have more clay in the upper part of the surface soil than is defined as the range for the series. Also, they do not have a sufficient increase in clay content in the subsoil. These differences, however, do not affect the use or behavior of these soils. The soils are classified as fine, mixed, mesic Cumulic Hapludolls.

Troxel soils are commonly adjacent to Carmi and Elston soils and to the Billett soils that have a gravelly substratum. Billett, Carmi, and Elston soils have more sand in the subsoil than the Troxel soils and have a thinner surface layer. They are at the higher elevations.

Typical pedon of Troxel silty clay loam, 0 to 2 percent slopes, in a cultivated field; 100 feet west and 1,400 feet north of the southeast corner of sec. 8, T. 22 N., R. 5 W.

Ap—0 to 12 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate medium granular structure; friable; slightly acid; abrupt smooth boundary.

A1—12 to 20 inches; black (N 2/0) silty clay loam, very dark grayish brown (2.5Y 3/2) dry; moderate medium granular structure; friable; slightly acid; clear wavy boundary.

A2—20 to 27 inches; black (N 2/0) silty clay loam, very dark grayish brown (2.5Y 3/2) dry; moderate medium granular structure; friable; neutral; clear wavy boundary.

A3—27 to 35 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate medium granular structure; friable; many fine pores; thin continuous black (N 2/0) organic coatings on faces of peds; neutral; clear smooth boundary.

A4—35 to 42 inches; black (10YR 2/1) clay loam, very dark gray (10YR 3/1) dry; moderate medium granular structure; thin continuous very dark grayish brown (2.5Y 3/2) organic coatings on faces of peds; neutral; clear smooth boundary.

2Bt1—42 to 47 inches; brown (10YR 4/3) loam; moderate medium subangular blocky structure; firm; thin continuous very dark grayish brown (2.5Y 3/2) clay films on faces of peds; neutral; clear wavy boundary.

2Bt2—47 to 52 inches; brown (10YR 4/3) loam; moderate medium subangular blocky structure; firm; thin continuous very dark grayish brown (2.5Y 3/2) clay films on faces of peds; neutral; clear wavy boundary.

2Bt3—52 to 61 inches; dark yellowish brown (10YR 4/4) fine sandy loam; moderate medium subangular blocky structure; friable; thin discontinuous very dark grayish brown (10YR 3/2) clay films on faces of peds; neutral; clear wavy boundary.

2Bt4—61 to 71 inches; dark yellowish brown (10YR 4/4) sandy loam; moderate medium subangular blocky structure; friable; thin continuous very dark grayish brown (10YR 3/2) clay films on faces of peds; 2 percent gravel; neutral; clear wavy boundary.

3BCt—71 to 80 inches; brown (10YR 4/3) gravelly coarse sand; single grained; loose; thin continuous brown (10YR 4/3) clay films bridging sand grains; 18 percent gravel; neutral.

The thickness of the solum ranges from 60 to more than 80 inches. The thickness of the silty material ranges from 40 to 60 inches. The total combined thickness of the A horizons ranges from 24 to 45 inches.

The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2.

The A horizon has hue of 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. It is silt loam, silty clay loam, or clay loam.

The 2Bt horizon has hue of 10YR or 7.5YR, value of 4, and chroma of 3 or 4. It is silty clay loam, fine sandy loam, clay loam, loam, or sandy loam. Reaction ranges from medium acid to neutral.

Wallkill Series

The Wallkill series consists of very deep, very poorly drained soils on till plains, recessional moraines, and outwash plains. These soils formed in recent alluvium and in the underlying organic deposits and coprogenous earth. Permeability is moderately slow in the mineral material, moderately slow to moderately rapid in the organic material, and slow in the underlying coprogenous earth. Slopes range from 0 to 2 percent.

The Wallkill soils in this survey area have more silt and less sand in the mineral material than are defined as the range for the series. These differences, however,

do not affect the use or behavior of these soils. The soils are classified as fine-silty, mixed, mesic Thapto-Histic Fluvaquents.

Wallkill soils are commonly adjacent to Drummer, Mahalasville, Pella, and Treaty soils. These associated soils formed in mineral material. They are in the slightly higher areas.

Typical pedon of Wallkill silt loam, coprogenous earth substratum, in an idle field; 1,640 feet east and 1,340 feet north of the southwest corner of sec. 11, T. 21 N., R. 3 W.

A—0 to 10 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate medium granular structure; friable; many fine roots; neutral; abrupt smooth boundary.

Bg1—10 to 20 inches; dark gray (10YR 4/1) silt loam; moderate fine subangular blocky structure; firm; common fine roots; few very fine pores; neutral; clear smooth boundary.

Bg2—20 to 27 inches; dark gray (10YR 4/1) silt loam; moderate fine subangular blocky structure; firm; common fine roots; few very fine pores; neutral; abrupt smooth boundary.

2Oa1—27 to 38 inches; sapric material, black (10YR 2/1) broken face and rubbed; 5 percent fiber, trace rubbed; moderate medium subangular blocky structure; firm; common fine and very fine roots; thin patchy dark gray (10YR 4/1) silt coatings on faces of peds; 30 percent mineral material; neutral; clear smooth boundary.

2Oa2—38 to 54 inches; sapric material, dark reddish brown (5YR 2.5/2) broken face and rubbed; 5 percent fiber, trace rubbed; moderate medium subangular blocky structure; friable; neutral; gradual smooth boundary.

3C—54 to 60 inches; very dark grayish brown (2.5Y 3/2) coprogenous earth; massive; friable; mildly alkaline.

The thickness of the mineral material ranges from 16 to 40 inches. Coprogenous earth is within a depth of 40 to 60 inches.

The Ap and Bg horizons have hue of 10YR, value of 3 or 4, and chroma of 1 or 2. Reaction is slightly acid or neutral.

The 2O horizon has hue of 5YR to 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. Reaction ranges from slightly acid to mildly alkaline.

The 3C horizon has hue of 5Y to 10YR, value of 2 to 5, and chroma of 1 to 3. Reaction ranges from slightly acid to mildly alkaline.

Washtenaw Series

The Washtenaw series consists of very deep, very poorly drained soils on recessional moraines and till plains. These soils formed in recent alluvium and in the underlying glacial drift. Permeability is moderate in the recent alluvium and slow in the underlying glacial drift. Slopes range from 0 to 2 percent.

The Washtenaw soils in this survey area have more silt and less sand in the upper part of the solum than are defined as the range for the series. These differences, however, do not affect the use or behavior of these soils. The soils are classified as fine-silty, mixed, mesic Aeric Fluvaquents.

Washtenaw soils are commonly adjacent to Crosby, Mahalasville, Miami, and Treaty soils. These adjacent soils do not have a buried dark surface layer. They are at the higher elevations.

Typical pedon of Washtenaw silt loam, in a cultivated field; 590 feet west and 2,110 feet north of the southeast corner of sec. 14, T. 22 N., R. 3 W.

Ap—0 to 10 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; many fine roots; strongly acid; abrupt smooth boundary.

C—10 to 23 inches; dark grayish brown (10YR 4/2) silt loam; weak medium platy structure parting to weak medium granular; friable; common very fine roots; slightly acid; clear smooth boundary.

2Ab—23 to 31 inches; very dark gray (10YR 3/1) silty clay loam; moderate medium subangular blocky structure; firm; common very fine pores; 7 percent gravel; slightly acid; clear smooth boundary.

2Btgb1—31 to 42 inches; dark gray (10YR 4/1) silty clay loam; common medium prominent dark yellowish brown (10YR 4/6) mottles; moderate medium subangular blocky structure; firm; common very fine pores; thin continuous dark gray (10YR 4/1) clay films on faces of peds; 3 percent gravel; neutral; clear smooth boundary.

2Btgb2—42 to 50 inches; gray (10YR 5/1) clay loam; common medium prominent dark yellowish brown (10YR 4/6) mottles; weak coarse subangular blocky structure; firm; thin continuous dark gray (10YR 4/1) clay films on faces of peds; 5 percent gravel; neutral; clear smooth boundary.

2Btgb3—50 to 65 inches; gray (10YR 5/1) loam; common medium prominent dark yellowish brown (10YR 4/6) mottles; weak coarse subangular blocky structure; firm; thin patchy very dark gray (10YR 4/1) clay films on faces of peds; 5 percent gravel; mildly alkaline; clear wavy boundary.

2C—65 to 70 inches; yellowish brown (10YR 5/4) loam;

common medium distinct grayish brown (10YR 5/2) mottles; firm; massive; 10 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 60 to 80 inches. The thickness of the recent alluvial material ranges from 20 to 40 inches.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 or 3.

The 2Ab horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2.

The 2Btgb horizon is mottled. It has hue of 10YR, value of 4 or 5, and chroma of 1 or 2. Reaction ranges from slightly acid to mildly alkaline.

Waupecan Series

The Waupecan series consists of well drained and moderately well drained soils on outwash plains. These soils are deep or very deep over gravelly sand. Permeability is moderate in the upper part of the solum, moderately rapid in the lower part of the solum, and very rapid in the underlying material. The soils formed in silty material and in the underlying gravelly sand outwash. Slopes range from 0 to 2 percent.

Waupecan soils are similar to Bowes and Bowes Variant soils and are commonly adjacent to Lafayette and Longlois soils and to the Mahalasville soils that have a gravelly substratum. Bowes and Bowes Variant soils have a dark surface layer less than 10 inches thick. Lafayette soils have a mottled subsoil that is grayer than that of the Waupecan soils. They are at the lower elevations. Longlois soils have more sand in the upper part of the subsoil than the Waupecan soils. They are on rises and in the more sloping areas along drainageways and depressions. Mahalasville soils have a dominantly gray subsoil. They are in depressions and drainageways.

Typical pedon of Waupecan silt loam, 0 to 2 percent slopes, in a cultivated field; 2,250 feet east and 2,120 feet south of the northwest corner of sec. 10, T. 22 N., R. 4 W.

Ap—0 to 11 inches; very dark gray (10YR 3/1) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; many fine roots; many fine pores; strongly acid; clear wavy boundary.

BA—11 to 17 inches; dark brown (10YR 4/3) silt loam; moderate medium granular structure; friable; many fine roots; many fine pores; thin continuous very dark grayish brown (10YR 3/2) organic coatings on faces of peds; strongly acid; clear smooth boundary.

Bt1—17 to 24 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak medium subangular blocky structure parting to moderate fine subangular blocky; firm; common fine roots; common fine pores; thin continuous dark yellowish brown (10YR 3/4) clay films on faces of peds; thin discontinuous very dark grayish brown (10YR 3/2) organic coatings on faces of peds; medium acid; clear smooth boundary.

Bt2—24 to 35 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure; firm; common fine roots; common fine pores; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; strongly acid; clear smooth boundary.

2Bt3—35 to 44 inches; dark brown (7.5YR 4/4) sandy loam; weak coarse subangular blocky structure; firm; few fine roots; common fine pores; thin discontinuous dark reddish brown (5YR 3/4) clay films on faces of peds; 5 percent gravel; strongly acid; clear smooth boundary.

2Bt4—44 to 61 inches; dark brown (7.5YR 4/4) loamy sand; weak medium subangular blocky structure; very friable; thin discontinuous dark reddish brown (5YR 3/4) clay films on faces of peds; 10 percent gravel; slightly acid; clear wavy boundary.

2C—61 to 70 inches; yellowish brown (10YR 5/4) gravelly sand; single grained; loose; 23 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 50 to more than 70 inches. The thickness of the silty material ranges from 24 to 55 inches.

The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The total combined thickness of the A horizons ranges from 10 to 20 inches.

The Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 4. Reaction ranges from strongly acid to neutral.

The 2Bt horizon has hue of 7.5YR or 10YR and value and chroma of 3 or 4. It is clay loam, sandy loam, or loamy sand or the gravelly analogs of these textures. Reaction ranges from strongly acid to neutral.

The 2C horizon has hue of 10YR, value of 5, and chroma of 3 or 4.

A moderately wet phase is recognized in the county.

Waynetown Series

The Waynetown series consists of somewhat poorly drained soils on outwash plains and stream terraces. These soils are deep or very deep over gravelly coarse sand. Permeability is moderate in the solum and very rapid in the underlying material. The soils formed in silty material, in loamy outwash, and in the underlying gravelly outwash. Slopes range from 0 to 2 percent.

Waynetown soils are similar to Mulvey soils and are commonly adjacent to Kalamazoo and Thackery soils

and to the Mahalasville soils that have a gravelly substratum. Mulvey soils have a darker surface layer than the Waynetown soils. Kalamazoo soils have a browner subsoil than the Waynetown soils and have more sand in the upper part of the subsoil. They are at the slightly higher elevations. Mahalasville soils have a dark surface layer and a gray subsoil. They are in depressional areas. Thackery soils do not have gray mottles in the upper part of the subsoil. They are in the slightly higher areas.

Typical pedon of Waynetown silt loam, 0 to 2 percent slopes, in a cultivated field; 500 feet east and 750 feet south of the northwest corner of sec. 28, T. 22 N., R. 4 W.

Ap—0 to 10 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; many fine roots; strongly acid; abrupt smooth boundary.

Bt1—10 to 18 inches; dark yellowish brown (10YR 4/4) silty clay loam; common distinct dark grayish brown (10YR 4/2) mottles; moderate fine subangular blocky structure; firm; common very fine roots; common very fine pores; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; medium acid; clear smooth boundary.

Bt2—18 to 26 inches; dark yellowish brown (10YR 4/4) silty clay loam; common medium distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; firm; common very fine roots; common very fine pores; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; thin continuous light brownish gray (10YR 6/2) silt coatings on faces of peds; medium acid; clear smooth boundary.

2Btg1—26 to 32 inches; grayish brown (10YR 5/2) clay loam; common medium prominent strong brown (7.5YR 4/6) mottles; moderate medium subangular blocky structure; firm; common very fine pores; thin continuous dark gray (10YR 4/1) clay films on faces of peds; 1 percent gravel; medium acid; clear smooth boundary.

3Btg2—32 to 44 inches; dark gray (10YR 4/1) gravelly sandy clay loam; common medium prominent strong brown (7.5YR 4/6) mottles; moderate coarse subangular blocky structure; firm; common very fine pores; thin continuous dark gray (10YR 4/1) clay films on faces of peds; 18 percent gravel; neutral; clear wavy boundary.

3Btg3—44 to 53 inches; dark grayish brown (10YR 4/2) gravelly sandy loam; common medium prominent strong brown (7.5YR 4/6) mottles; weak coarse subangular blocky structure; friable; thin discontinuous dark gray (10YR 4/1) clay films on faces of peds; 20 percent gravel; neutral; clear wavy boundary.

3Cg—53 to 60 inches; grayish brown (10YR 5/2) gravelly coarse sand; common medium distinct yellowish brown (10YR 5/4) mottles; single grained; loose; 25 percent gravel; strong effervescence; mildly alkaline.

The thickness of the solum ranges from 50 to 70 inches. The thickness of the silty material ranges from 20 to 40 inches.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3.

The Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. It is medium acid or slightly acid.

The 2Btg horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2. It is medium acid or slightly acid.

The 3Btg horizon has colors similar to those of the 2Btg horizon. It is neutral or mildly alkaline.

The 3C horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2. It is coarse sand or gravelly coarse sand.

Wea Series

The Wea series consists of very deep, well drained soils on flood plains. These soils formed in silty alluvium and in the underlying loamy and gravelly outwash. Permeability is moderate in the solum and very rapid in the underlying material. Slopes range from 0 to 2 percent.

Wea soils are commonly adjacent to Allison and Battleground soils and to the Ouiatenon soils that have a sandy substratum. Allison and Battleground soils have less sand in the upper part of the subsoil than the Wea soils. Also, Battleground soils have a dark surface layer less than 24 inches thick. Allison and Battleground soils are at the slightly lower elevations. Ouiatenon soils have less clay and more sand in the subsoil than the Wea soils and do not have an argillic horizon. They are in the higher lying areas.

Typical pedon of Wea silt loam, occasionally flooded, in a cultivated field; 2,440 feet east and 460 feet south of the northwest corner of sec. 9, T. 23 N., R. 4 W.

Ap—0 to 10 inches; very dark gray (10YR 3/1) silt loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; friable; many very fine roots; 2 percent gravel; neutral; abrupt smooth boundary.

A—10 to 25 inches; very dark gray (10YR 3/1) silt loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; friable; common very fine roots; common very fine pores; 2 percent

gravel; neutral; clear smooth boundary.

2Bt1—25 to 31 inches; dark brown (7.5YR 3/2) clay loam, dark grayish brown (10YR 4/2) dry; moderate fine subangular blocky structure; firm; common very fine roots; common very fine pores; thin continuous dark reddish brown (5YR 2.5/2) clay films on faces of peds; thin continuous black (10YR 2/1) organic coatings on faces of peds; 5 percent gravel; neutral; clear smooth boundary.

3Bt2—31 to 37 inches; dark brown (7.5YR 3/4) gravelly sandy clay loam, dark grayish brown (10YR 4/2) dry; moderate medium subangular blocky structure; firm; common very fine pores; thin continuous dark brown (7.5YR 3/2) clay films on faces of peds; 20 percent gravel; neutral; clear smooth boundary.

3Bt3—37 to 47 inches; dark brown (7.5YR 3/4) gravelly sandy loam; weak coarse subangular blocky structure; friable; common very fine pores; thin continuous dark brown (7.5YR 3/4) clay films on faces of peds; 28 percent gravel; neutral; clear wavy boundary.

3Bt4—47 to 59 inches; dark brown (7.5YR 4/4) gravelly sandy loam; weak coarse subangular blocky structure; friable; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; 30 percent gravel; neutral; clear wavy boundary.

3BCt—59 to 64 inches; dark yellowish brown (10YR 4/4) gravelly sandy loam; weak fine subangular blocky structure; friable; thin discontinuous very dark grayish brown (10YR 3/2) clay films on faces of peds; 33 percent gravel; mildly alkaline; clear wavy boundary.

3C—64 to 70 inches; yellowish brown (10YR 5/4) gravelly sand; single grained; loose; 33 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 60 to 70 inches. The thickness of the mollic epipedon ranges from 24 to 40 inches.

The Ap horizon has hue of 10YR, value of 3, and chroma of 1 or 2.

The 2Bt horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. It is sandy clay loam or clay loam. Reaction is slightly acid or neutral.

The 3Bt horizon has hue of 7.5YR or 10YR and value and chroma of 3 or 4. Reaction ranges from slightly acid to mildly alkaline.

The 3C horizon has hue of 10YR, value of 5, and chroma of 3 or 4. Textures include sand and gravelly sand.

Whitaker Series

The Whitaker series consists of somewhat poorly drained soils on till plains. These soils are deep over compact glacial till. Permeability is moderate in the solum and slow in the underlying material. The soils formed in glaciofluvial deposits overlying glacial till. Slopes range from 0 to 2 percent.

Whitaker soils are commonly adjacent to Mahalasville and Treaty soils. Mahalasville and Treaty soils have a dark surface layer and a gray subsoil. They are in the lower positions on the landscape.

Typical pedon of Whitaker loam, till substratum, 0 to 2 percent slopes, in a cultivated field; 2,075 feet west and 1,780 feet north of the southeast corner of sec. 14, T. 22 N., R. 5 W.

Ap—0 to 10 inches; brown (10YR 4/3) loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; many very fine roots; medium acid; abrupt smooth boundary.

Bt—10 to 17 inches; brown (10YR 5/3) loam; common fine faint grayish brown (10YR 5/2) and prominent strong brown (7.5YR 4/6) mottles; moderate fine subangular blocky structure; firm; common very fine roots; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; slightly acid; gradual smooth boundary.

Btg1—17 to 43 inches; grayish brown (10YR 5/2) clay loam; common coarse prominent strong brown (7.5YR 4/6) mottles; moderate medium subangular blocky structure; firm; common very fine roots; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; neutral; gradual smooth boundary.

Btg2—43 to 50 inches; gray (10YR 5/1) sandy clay loam; common coarse prominent strong brown (7.5YR 4/6) mottles; moderate coarse subangular blocky structure; firm; few very fine roots; thin continuous dark gray (10YR 4/1) clay films on faces of peds; mildly alkaline; clear wavy boundary.

Btg3—50 to 58 inches; grayish brown (10YR 5/2) loamy sand; common medium distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; very friable; thin discontinuous dark gray (10YR 4/1) clay films on faces of peds; mildly alkaline; clear smooth boundary.

2Cd—58 to 70 inches; yellowish brown (10YR 5/4) loam; weak medium platy till structure; very firm; 4 percent gravel; strong effervescence; mildly alkaline.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the silty material ranges from 0 to 20 inches.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 or 3. It is loam or silt loam.

The B horizon is mottled. It has hue of 10YR, value

of 4 or 5, and chroma of 1 to 4. It is loam, clay loam, and sandy clay loam in the upper part and sandy loam and loamy sand in the lower part. Reaction ranges from strongly acid to moderately alkaline.

The 2Cd horizon has hue of 10YR, value of 5, and chroma of 2 to 4.

Formation of the Soils

This section describes the major factors of soil formation and their importance in the formation of the soils in Tippecanoe County. It also describes the processes of soil formation that have affected the soils in the county.

Factors of Soil Formation

Soil is produced by soil-forming processes acting on material deposited or accumulated by geologic agents. The characteristics of the soil at any given point are determined by the physical and mineralogical composition of the parent material; the climate under which the soil formed; the plant and animal life on and in the soil; the relief, or lay of the land; and the length of time the forces of soil formation have acted on the soil material.

Climate and living organisms, chiefly plants, are active factors of soil formation. They act on the parent material that has accumulated through the weathering of rocks and slowly change it into a natural body that has genetically related horizons. The effects of climate and living organisms are conditioned by relief. The parent material also affects the kind of soil profile that is formed and, in extreme cases, determines it almost entirely. Finally, time is needed for the development of a soil profile. Some time is always required for the differentiation of soil horizons. Usually, a long time is needed for the development of distinct horizons.

The factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effects of any one factor unless conditions are specified for the other four. Many of the processes of soil formation are unknown.

Parent Material

Parent material is the unconsolidated mass in which a soil forms. It determines the limits of the chemical and mineralogical composition of the soil.

Glaciers covered Tippecanoe County as recently as about 20,000 years ago. The parent material of the soils of Tippecanoe County was mostly deposited by glaciers, by meltwater from the glaciers, or by windblown silt and sand. After this material was deposited, some of it was reworked and redeposited by subsequent actions of wind and water. Where the glacial deposits are thin, the parent material is material weathered from bedrock. Although the parent materials in the county are of similar glacial origin, their properties vary greatly, sometimes within small areas, depending on how the materials were deposited.

Some of the soils on the till plain have been influenced by lacustrine deposits. In some small areas on the till plain and in glacial sluiceways, the soils formed entirely in lacustrine material. Soils along streams formed in recent alluvium. A layer of silty material or loess covers much of the survey area.

In Tippecanoe County, the bedrock beneath the unconsolidated deposits consists of siltstone and shale. In the western part of the county, the bedrock is Mississippian age siltstone and shale. New Albany shale of Devonian age is in the eastern part of the county. Some soils formed in residuum derived from the underlying bedrock. These soils are in areas where the glacial deposits, if any, are thin.

Several glaciers have covered the county, but the Wisconsinan glacier, which was the most recent, has had the greatest influence on the soils. The thickness of the glacial drift ranges from 0 to about 350 feet. The shallowest areas are in the West Point and Americus areas. The drift is thickest in the part of the county along lines that correspond to the Old Teays River System, a preglacial system that ran in a general east-west direction across central Indiana (Wayne, 1956).

Glacial till is material laid down directly by glaciers with a minimum of water action. It consists of particles of different sizes that are mixed together. The pebbles include a wide variety of rocks, ranging from sedimentary rocks, such as black shale, to igneous rocks, such as granite. The glacial till in Tippecanoe County is mostly calcareous. The texture of the till is mainly loam, but in some areas it is sandy loam or silt loam. Silt loam till is confined mainly to a high area in the northwestern part of the county. Layers of sand,

loamy sand, and gravel are common. Generally, the till is firm and compact because of consolidation by the glacial ice that covered it. In some areas the till is friable. A thin layer of loess covers much of the till in the less sloping areas. Stratified sand and gravel underlie much of the glacial till throughout the county. The sand and gravel have been bonded into a hard mass by calcium carbonates in areas where they crop out on steep slopes. An example of soils that formed in glacial till are Strawn soils. These soils are typically moderately fine textured in the subsoil.

Outwash material was deposited by running water from melting glaciers. The size of the particles that make up outwash material varies, depending on the velocity of the water that carried them. When the water slowed down, the coarser particles were deposited first. Finer particles, such as very fine sand, silt, and clay, were carried along in the stream by slowly moving water.

Because of this sorting action, outwash deposits generally occur as layers of particles that are similar in size, such as silt, sand, or gravel. In Tippecanoe County these deposits are on stream terraces, outwash plains, kames, and eskers. Most of outwash plain areas are covered by a blanket of loess. Consequently, the soils in these areas formed in both the loess and the outwash material. The Elston soils that have a gravelly substratum are examples of soils that formed in outwash.

Residuum is material weathered from bedrock. The nature of the bedrock determines the chemical and mineralogical characteristics of the soils that form in it. The bedrock in the survey area is sedimentary rock of Mississippian and Devonian age. Bedrock of Mississippian age is mostly siltstone that has thin layers of shale (fig. 19). It is generally in the western part of the county. Bedrock of Devonian age is mostly shale and generally is in the eastern part of the county. Berks soils formed in residuum derived from Mississippian age bedrock.

Lacustrine material was deposited from still or ponded glacial meltwater. The coarser fragments drop out of moving water as outwash, and only the finer particles, such as very fine sand, silt, and clay, remain to settle out in still water. Lacustrine deposits in Tippecanoe County are dominantly silty or clayey. Milford soils are examples.

Alluvial material was deposited by floodwaters of streams in recent time. This material varies in texture, depending on the speed of the water by which it was deposited. Ouiatenon and Battleground soils formed in alluvium.

Organic deposits consist of partially decomposed plant remains. After the glaciers withdrew from the area, water was left standing in lakes and in depressions on outwash plains, flood plains, and till plains. Grasses and sedges growing in these shallow lakes died, and their remains fell to the bottom. Because of the wetness in these areas, the plant remains did not decompose. The lakes eventually filled with organic material, which developed into muck. Houghton soils formed in organic material.

Loess is fine grained material consisting dominantly of silt-sized particles. The loess in Tippecanoe County was carried by the wind from western sources after the glaciers melted. Since the wind picked up mostly silt-sized particles, the loess deposits have a very high content of silt. In Tippecanoe County the soil layers that formed in loess are silt loam or silty clay loam. Fincastle and Toronto soils formed in 22 to 40 inches of loess over glacial till.

Plant and Animal Life

Plants have been the main living organisms influencing the soils in the county; however, bacteria, fungi, earthworms, and animals have also had an important effect.

The chief contribution of plant and animal life is the addition of organic matter and nitrogen to the soil. The kind of organic material on and in the soil depends on the kinds of plants that grew on the soil. The remains of these plants accumulate on the surface and in the soil. They decay and eventually become organic matter. Plant roots provide channels for the downward movement of water through the soil, bring plant nutrients from the lower part of the profile to the upper part, and add organic matter as they decay. Bacteria in the soil help to break down the organic matter into plant nutrients.

The native vegetation in Tippecanoe County consisted of prairie grasses and deciduous forests. Generally, the prairie areas were in the western part of the county and the wooded areas were in the eastern part.

The soils in the prairie areas have more total accumulated organic matter than the soils in the timbered areas. The vegetation in these prairie areas consisted chiefly of tall prairie grasses. Where the prairie and timber areas met, there was a mixture of grasses and trees. Raub, Brenton, and Drummer soils formed under prairie vegetation.

In the timbered areas of the county, differences in natural soil drainage and minor changes in the parent material affected the composition of the forest species. Well drained soils, such as Miami soils, were covered by sugar maple, walnut, poplar, hickory, beech, and several species of oak. Elm, ash, pin oak, swamp white

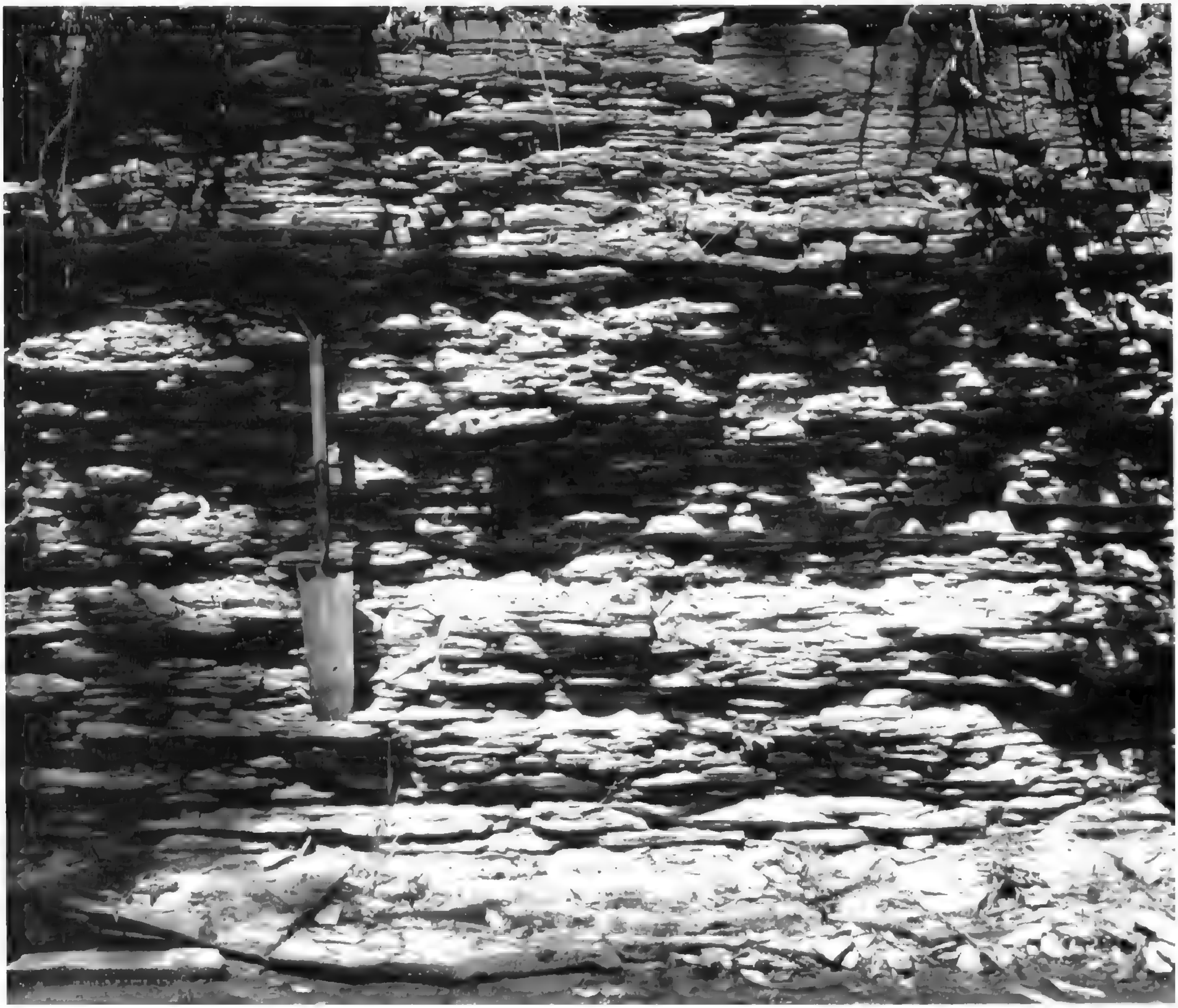

Figure 19.—Interbedded siltstone and shale bedrock of Mississippian age.

oak, soft maple, and some marsh grasses and sedges were common on the very poorly drained soils. The very poorly drained Mahalasville and Treaty soils formed under wet conditions.

Climate

Climate determines the kind of plant and animal life on and in the soil and the amount of water available for the weathering of minerals and the transportation of soil material. Through its effect on soil temperature, it determines the rate of chemical reactions in the soil. These effects tend to be uniform in relatively small areas, such as those the size of a county.

The climate in Tippecanoe County is cool and humid. It is presumably similar to the one that prevailed during the period when the soils were forming. The soils in the county differ from those that formed under a dry, warm climate and from those that formed under a hot, moist climate. Although the climate is uniform throughout the

county, its effects are modified locally by runoff, direction of slope, and steepness of slope. Therefore, the differences among the soils in the county are, to a minor extent, the result of climatic differences.

Relief

Relief, or topography, has a marked effect on soil formation through its influence on natural drainage, erosion, plant cover, and soil temperature. In Tippecanoe County, slopes range from 0 to 60 percent. Natural soil drainage classes in the county range from excessively drained in the more sloping areas to very poorly drained in the depressions.

Relief influences the formation of soils by affecting runoff and drainage. Drainage, through its effect on aeration of the soil, determines the soil color. Runoff is greatest on the steeper slopes. In many low areas, water is temporarily ponded. Water and air move freely through most soils that are well drained and slowly through most soils that are very poorly drained. Iron compounds give most soils their color. Well drained soils are brightly colored and oxidized. Poorly aerated soils are dull gray and mottled because iron compounds are in a reduced state. Miami and Kalamazoo soils are examples of well drained, well aerated soils. Milford soils are examples of poorly aerated, very poorly drained soils.

Time

Differences in the length of time that the parent material has been in place are commonly reflected in the degree of development of the soil profile. Some soils develop rapidly; others develop slowly.

The soils in Tippecanoe County range from young to mature. The glacial deposits in which many of the soils formed have been exposed to the soil-forming factors long enough for the development of distinct horizons within the soil profile. However, some soils that formed in recent alluvial sediment have not been in place long enough for the formation of distinct horizons.

Ouiatenon soils are young soils that formed in alluvial material. Miami soils show the effect of time on the leaching of lime from the soil. The parent material in which these soils formed was calcareous. The soils are now leached to a depth of 24 to 40 inches.

Processes of Soil Formation

Several processes have been involved in the formation of the soils in Tippecanoe County. These processes are the accumulation of organic matter; the dissolution, transfer, and removal of calcium carbonates and bases; and the liberation and translocation of silicate clay minerals. In most soils, more than one of these processes have been responsible for horizon differentiation.

Some organic matter has accumulated in the surface layer of all of the soils of the county. The content of organic matter is low in some soils but is high in others. Generally, the soils that have the most organic matter, such as Drummer soils, have a thick, black surface layer.

Carbonates and bases have been leached from the upper horizons of nearly all of the soils in the county. Leaching probably preceded the translocation of silicate clay minerals. Most of the carbonates and bases have been leached from the A and B horizons of well drained soils. Even in the wettest soils, leaching is indicated by the absence of carbonates and by an acid reaction.

Clay accumulates in pores and other voids and forms films along which water moves. The leaching of bases and translocation of silicate clays are among the more important processes in horizon differentiation in the soils of the survey area. Miami soils are examples of soils in which translocated silicate clays have accumulated in the Bt horizon in the form of clay films.

Gleying, or the reduction and transfer of iron, has occurred in all of the very poorly drained, poorly drained, and somewhat poorly drained soils in Tippecanoe County. In the naturally wet soils, this process has been significant in horizon differentiation. The gray color of the subsoil indicates the reduction of iron oxides. The reduction is commonly accompanied by some transfer and redistribution of the iron from the upper horizons to lower horizons or completely out of the profile. The mottles that occur in some horizons indicate the segregation of iron.

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Glossary

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to flooding.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles 2 millimeters to 38 centimeters (15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly

pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, subsurface. Removal of excess ground water through buried drains. The drains collect the water and convey it to a gravity or pump outlet.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

End moraine. See Terminal moraine.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, for example, fire, that exposes the surface.

Esker (geology). A narrow, winding ridge of stratified gravelly and sandy drift deposited by a stream flowing in a tunnel beneath a glacier.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, or clay.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by

streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, any plowed or disturbed surface layer.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) granular, prismatic, or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the

immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame (geology). An irregular, short ridge or hill of stratified glacial drift.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by the wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, recessional, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in

various stages of decomposition.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Recessional moraine. An end moraine built during a temporary but significant halt in the final retreat of a glacier.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 drawbar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil

is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saprolite (soil science). Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Sedimentary peat. See Coprogenous earth.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the substratum. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic

arrangement of strips or bands which provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons. It includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). A layer of otherwise suitable soil material that is too thin for the specified use.

Till plain. An extensive area of nearly level to undulating soils underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Underlying material. See Substratum.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1961-90 at Lafayette, Indiana)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January	31.0	13.9	22.4	60	-19	10	1.73	0.61	2.66	3	6.1
February	35.3	16.8	26.1	63	-14	17	1.66	.75	2.44	4	6.3
March	47.7	28.9	38.3	77	2	116	2.98	1.75	4.08	6	2.7
April	60.5	39.2	49.9	84	19	321	3.61	1.87	5.12	7	.7
May	72.0	49.5	60.8	90	28	644	3.87	2.09	5.44	7	.0
June	81.2	58.9	70.0	95	40	901	3.81	2.04	5.36	6	.0
July	84.4	62.6	73.5	97	45	1,038	3.90	2.13	5.46	6	.0
August	82.3	60.1	71.2	94	41	966	3.54	1.91	4.98	5	.0
September	76.8	53.3	65.0	92	32	750	2.84	1.63	4.09	5	.0
October	64.5	41.4	53.0	86	21	413	2.52	1.40	3.51	5	.3
November	50.3	32.3	41.3	75	12	144	2.88	1.47	4.11	5	1.0
December	36.4	20.5	28.4	64	-12	28	2.71	1.10	4.08	5	5.2
Yearly:											
Average	60.2	39.8	50.0	---	---	---	---	---	---	---	---
Extreme	106	-25	---	98	-20	---	---	---	---	---	---
Total	---	---	---	---	---	5,349	36.03	31.73	39.97	64	22.4

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1961-90 at Lafayette, Indiana)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 24	May 11	May 18
2 years in 10 later than--	Apr. 18	May 4	May 13
5 years in 10 later than--	Apr. 6	Apr. 22	May 2
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 15	Oct. 4	Sept. 23
2 years in 10 earlier than--	Oct. 20	Oct. 9	Sept. 27
5 years in 10 earlier than--	Oct. 31	Oct. 18	Oct. 4

TABLE 3.--GROWING SEASON

(Recorded in the period 1961-90 at Lafayette, Indiana)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	184	156	136
8 years in 10	192	163	142
5 years in 10	208	178	154
2 years in 10	224	193	166
1 year in 10	232	201	172

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
Am	Allison silt loam, protected	390	0.1
Ap	Allison silt loam, frequently flooded	928	0.3
AtB2	Alvin-Spinks complex, 2 to 6 percent slopes, eroded	519	0.2
Ba	Battleground silt loam, protected	355	0.1
Bb	Battleground silt loam, frequently flooded	4,516	1.4
BgA	Beecher silt loam, 0 to 2 percent slopes	436	0.1
BkF	Berks channery silt loam, 25 to 60 percent slopes	114	*
BlA	Billett fine sandy loam, gravelly substratum, 0 to 2 percent slopes	1,150	0.4
BlB2	Billett fine sandy loam, gravelly substratum, 2 to 6 percent slopes, eroded	202	0.1
BmA	Billett fine sandy loam, moderately wet, 0 to 2 percent slopes	205	0.1
BnA	Billett loam, gravelly substratum, 0 to 2 percent slopes	3,809	1.2
BnB2	Billett loam, gravelly substratum, 2 to 6 percent slopes, eroded	676	0.2
BoA	Bowes silt loam, 0 to 2 percent slopes	1,508	0.5
BpA	Bowes Variant silt loam, 0 to 2 percent slopes	282	0.1
CaA	Camden silt loam, 0 to 2 percent slopes	3,074	1.0
CfB	Carmi sandy loam, 2 to 6 percent slopes	1,106	0.3
CgA	Carmi loam, 0 to 2 percent slopes	1,896	0.6
Ck	Ceresco sandy loam, gravelly substratum, rarely flooded	427	0.1
Cl	Ceresco loam, gravelly substratum, occasionally flooded	3,056	0.9
Cm	Chalmers silty clay loam	555	0.2
Co	Cohoctah fine sandy loam, gravelly substratum, rarely flooded	499	0.2
Cp	Cohoctah loam, gravelly substratum, occasionally flooded	2,429	0.8
CrC	Coloma sand, 6 to 15 percent slopes	376	0.1
CtA	Crosby silt loam, 0 to 2 percent slopes	4,715	1.5
CwB2	Crosby-Miami complex, 2 to 6 percent slopes, eroded	15,018	4.7
DmC2	Desker gravelly sandy loam, 6 to 12 percent slopes, eroded	418	0.1
DoC2	Desker sandy loam, kame, 6 to 12 percent slopes, eroded	1,030	0.3
DpD2	Desker-Rodman complex, kame, 12 to 18 percent slopes, eroded	461	0.1
Du	Drummer soils	42,946	13.3
Dy	Du Page loam, frequently flooded	447	0.1
EkA	Elston sandy loam, gravelly substratum, 0 to 2 percent slopes	1,315	0.4
EmA	Elston loam, gravelly substratum, 0 to 2 percent slopes	9,021	2.8
FcB	Fincastle-Crosby complex, 1 to 3 percent slopes	3,414	1.1
Hd	Harpster silt loam, pothole	117	*
HfB2	High Gap Variant silt loam, 1 to 6 percent slopes, eroded	342	0.1
HfC2	High Gap Variant silt loam, 6 to 12 percent slopes, eroded	115	*
HnB	Hononegah loamy sand, 2 to 6 percent slopes	456	0.1
HoA	Hononegah fine sandy loam, 0 to 2 percent slopes	2,020	0.6
Hv	Houghton muck, undrained	319	0.1
KaA	Kalamazoo loam, 0 to 2 percent slopes	2,368	0.7
KaB2	Kalamazoo loam, 2 to 6 percent slopes, eroded	832	0.3
KbB2	Kalamazoo silt loam, 2 to 6 percent slopes, eroded	1,234	0.4
KcB2	Kalamazoo silt loam, kame, 2 to 6 percent slopes, eroded	803	0.2
KcC2	Kalamazoo silt loam, kame, 6 to 12 percent slopes, eroded	455	0.1
KoD2	Kosciusko sandy loam, 12 to 18 percent slopes, eroded	202	0.1
KpC3	Kosciusko gravelly sandy clay loam, 6 to 12 percent slopes, severely eroded	678	0.2
LaA	Lafayette silt loam, 0 to 2 percent slopes	1,687	0.5
LeA	La Hogue loam, till substratum, 0 to 2 percent slopes	394	0.1
Lm	Lash silt loam, frequently flooded	1,283	0.4
LnA	Lauramie silt loam, 0 to 2 percent slopes	727	0.2
LnB2	Lauramie silt loam, 2 to 6 percent slopes, eroded	3,472	1.1
LoA	Linkville loam, loamy substratum, 0 to 2 percent slopes	444	0.1
LoB	Linkville loam, loamy substratum, 2 to 6 percent slopes	334	0.1
LvB2	Longlois silt loam, 2 to 6 percent slopes, eroded	947	0.3
LwB2	Longlois silt loam, kame, 2 to 6 percent slopes, eroded	2,194	0.7
Mb	Mahalasville silty clay loam, gravelly substratum	6,365	2.0
Mc	Mahalasville silty clay loam, shale substratum	181	0.1
Md	Mahalasville-Treaty complex	12,868	4.0
MmB2	Marker silt loam, 2 to 6 percent slopes, eroded	1,574	0.5
MoA	Mellott silt loam, 0 to 2 percent slopes	3,158	1.0
MsC2	Miami silt loam, 6 to 12 percent slopes, eroded	3,684	1.1
MsD2	Miami silt loam, 12 to 18 percent slopes, eroded	1,212	0.4

See footnote at end of table.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
MtC3	Miami clay loam, 6 to 12 percent slopes, severely eroded	1,532	0.5
MtD3	Miami clay loam, 12 to 18 percent slopes, severely eroded	207	0.1
Mu	Milford silty clay loam, pothole	1,869	0.6
MwA	Mulvey silt loam, 0 to 2 percent slopes	293	0.1
Mz	Muskego muck, drained	376	0.1
OaB2	Oakville-Billett, moderately wet, complex, 2 to 6 percent slopes, eroded	272	0.1
OgA	Ockley silt loam, 0 to 2 percent slopes	2,642	0.8
OmB2	Octagon silt loam, 2 to 6 percent slopes, eroded	3,508	1.1
OmC2	Octagon silt loam, 6 to 12 percent slopes, eroded	1,070	0.3
OpC3	Octagon clay loam, 6 to 12 percent slopes, severely eroded	323	0.1
Ou	Ouiatenon sandy loam, frequently flooded	2,182	0.7
Ox	Ouiatenon loamy sand, occasionally flooded	4,578	1.4
Oy	Ouiatenon fine sandy loam, sandy substratum, frequently flooded	577	0.2
Pc	Palms muck, drained	642	0.2
Pd	Palms muck, gravelly substratum, undrained	266	0.1
Pg	Pella silty clay loam, pothole	1,354	0.4
Pk	Peotone silty clay loam, pothole	994	0.3
PmB	Pinevillage gravelly sandy loam, 2 to 8 percent slopes, rarely flooded	527	0.2
Pt	Pits, gravel	1,258	0.4
RaB2	Rainsville silt loam, 2 to 6 percent slopes, eroded	796	0.2
RcA	Raub-Brenton complex, 0 to 1 percent slopes	6,344	2.0
RdA	Richardville silt loam, 0 to 2 percent slopes	1,322	0.4
RdB2	Richardville silt loam, 2 to 6 percent slopes, eroded	6,060	1.9
RdC2	Richardville silt loam, 6 to 12 percent slopes, eroded	605	0.2
RoB	Rockfield silt loam, 1 to 3 percent slopes	5,149	1.6
RsF	Rodman gravelly loam, 25 to 60 percent slopes	2,130	0.7
Rz	Ross silt loam, protected	142	*
Sd	Saranac silty clay, gravelly substratum, occasionally flooded	285	0.1
Sf	Sawabash silty clay loam, frequently flooded	612	0.2
ShB	Shadeland silt loam, 1 to 4 percent slopes	283	0.1
SmA	Sleeth loam, 0 to 2 percent slopes	509	0.2
Sn	Sloan clay loam, occasionally flooded	2,839	0.9
So	Sloan Variant silty clay loam, occasionally flooded	303	0.1
SrB	Sparta sand, 2 to 6 percent slopes	493	0.2
SrC	Sparta sand, 6 to 12 percent slopes	253	0.1
StC	Spinks fine sand, 6 to 12 percent slopes	146	*
SwA	Starks-Fincastle complex, 0 to 2 percent slopes	37,753	11.7
SyF	Strawn-Rodman complex, 18 to 50 percent slopes	9,058	2.8
TbA	Tecumseh silt loam, 0 to 2 percent slopes	1,355	0.4
TcA	Thackery silt loam, 0 to 2 percent slopes	425	0.1
TfB	Throckmorton silt loam, 1 to 3 percent slopes	9,690	3.0
Tg	Tice silty clay loam, frequently flooded	887	0.3
TmA	Toronto-Millbrook complex, 0 to 2 percent slopes	25,636	8.0
TnB2	Toronto-Octagon complex, 2 to 6 percent slopes, eroded	2,472	0.8
TtA	Troxel silty clay loam, 0 to 2 percent slopes	1,264	0.4
Ua	Udorthents, loamy	3,654	1.1
UbB	Urban land-Billett, gravelly substratum, complex, 2 to 8 percent slopes	517	0.2
UcA	Urban land-Carmi complex, 0 to 2 percent slopes	2,043	0.6
UmB	Urban land-Miami complex, 2 to 8 percent slopes	769	0.2
UmC	Urban land-Miami complex, 8 to 15 percent slopes	748	0.2
UsA	Urban land-Starks-Fincastle complex, 0 to 2 percent slopes	6,202	1.9
Wb	Wallkill silt loam, coprogenous earth substratum	527	0.2
We	Washtenaw silt loam	588	0.2
WgA	Waupecan silt loam, 0 to 2 percent slopes	4,108	1.3
WhA	Waupecan silt loam, moderately wet, 0 to 2 percent slopes	1,343	0.4
WmA	Waynetown silt loam, 0 to 2 percent slopes	393	0.1
WtA	Wea silt loam, occasionally flooded	300	0.1
WuA	Whitaker loam, till substratum, 0 to 2 percent slopes	443	0.1
	Water areas more than 40 acres in size	895	0.3
	Water areas less than 40 acres in size	431	0.1
	Total	322,000	100.0

* Less than 0.1 percent.

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
Am	Allison silt loam, protected
Ap	Allison silt loam, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
AtB2	Alvin-Spinks complex, 2 to 6 percent slopes, eroded
Ba	Battleground silt loam, protected
Bb	Battleground silt loam, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
BgA	Beecher silt loam, 0 to 2 percent slopes (where drained)
BlA	Billett fine sandy loam, gravelly substratum, 0 to 2 percent slopes
BlB2	Billett fine sandy loam, gravelly substratum, 2 to 6 percent slopes, eroded
BmA	Billett fine sandy loam, moderately wet, 0 to 2 percent slopes
BnA	Billett loam, gravelly substratum, 0 to 2 percent slopes
BnB2	Billett loam, gravelly substratum, 2 to 6 percent slopes, eroded
BoA	Bowes silt loam, 0 to 2 percent slopes
BpA	Bowes Variant silt loam, 0 to 2 percent slopes
CaA	Camden silt loam, 0 to 2 percent slopes
CfB	Carmi sandy loam, 2 to 6 percent slopes
CgA	Carmi loam, 0 to 2 percent slopes
Ck	Ceresco sandy loam, gravelly substratum, rarely flooded (where drained)
Cl	Ceresco loam, gravelly substratum, occasionally flooded (where drained)
Cm	Chalmers silty clay loam (where drained)
Co	Cohoctah fine sandy loam, gravelly substratum, rarely flooded (where drained)
Cp	Cohoctah loam, gravelly substratum, occasionally flooded (where drained)
CtA	Crosby silt loam, 0 to 2 percent slopes (where drained)
CwB2	Crosby-Miami complex, 2 to 6 percent slopes, eroded (where drained)
Du	Drummer soils (where drained)
Dy	Du Page loam, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
EkA	Elston sandy loam, gravelly substratum, 0 to 2 percent slopes
EmA	Elston loam, gravelly substratum, 0 to 2 percent slopes
FcB	Fincastle-Crosby complex, 1 to 3 percent slopes (where drained)
HfB2	High Gap Variant silt loam, 1 to 6 percent slopes, eroded
KaA	Kalamazoo loam, 0 to 2 percent slopes
KaB2	Kalamazoo loam, 2 to 6 percent slopes, eroded
KbB2	Kalamazoo silt loam, 2 to 6 percent slopes, eroded
KcB2	Kalamazoo silt loam, kame, 2 to 6 percent slopes, eroded
LaA	Lafayette silt loam, 0 to 2 percent slopes (where drained)
LeA	La Hogue loam, till substratum, 0 to 2 percent slopes (where drained)
Lm	Lash silt loam, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
LnA	Lauramie silt loam, 0 to 2 percent slopes
LnB2	Lauramie silt loam, 2 to 6 percent slopes, eroded
LoA	Linkville loam, loamy substratum, 0 to 2 percent slopes
LoB	Linkville loam, loamy substratum, 2 to 6 percent slopes
LvB2	Longlois silt loam, 2 to 6 percent slopes, eroded
LwB2	Longlois silt loam, kame, 2 to 6 percent slopes, eroded
Mb	Mahalasville silty clay loam, gravelly substratum (where drained)
Mc	Mahalasville silty clay loam, shale substratum (where drained)
Md	Mahalasville-Treaty complex (where drained)
MmB2	Marker silt loam, 2 to 6 percent slopes, eroded
MoA	Mellott silt loam, 0 to 2 percent slopes
MwA	Mulvey silt loam, 0 to 2 percent slopes (where drained)
OgA	Ockley silt loam, 0 to 2 percent slopes
OmB2	Octagon silt loam, 2 to 6 percent slopes, eroded
RaB2	Rainsville silt loam, 2 to 6 percent slopes, eroded
RcA	Raub-Brenton complex, 0 to 1 percent slopes (where drained)
RdA	Richardville silt loam, 0 to 2 percent slopes
RdB2	Richardville silt loam, 2 to 6 percent slopes, eroded
RoB	Rockfield silt loam, 1 to 3 percent slopes

TABLE 5.--PRIME FARMLAND--Continued

Map symbol	Soil name
Rz	Ross silt loam, protected
Sd	Saranac silty clay, gravelly substratum, occasionally flooded (where drained)
Sf	Sawabash silty clay loam, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
ShB	Shadeland silt loam, 1 to 4 percent slopes (where drained)
SmA	Sleeth loam, 0 to 2 percent slopes (where drained)
Sn	Sloan clay loam, occasionally flooded (where drained)
So	Sloan Variant silty clay loam, occasionally flooded (where drained)
SwA	Starks-Fincastle complex, 0 to 2 percent slopes (where drained)
TbA	Tecumseh silt loam, 0 to 2 percent slopes
TcA	Thackery silt loam, 0 to 2 percent slopes
TfB	Throckmorton silt loam, 1 to 3 percent slopes
Tg	Tice silty clay loam, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
TmA	Toronto-Millbrook complex, 0 to 2 percent slopes (where drained)
TnB2	Toronto-Octagon complex, 2 to 6 percent slopes, eroded (where drained)
TtA	Troxel silty clay loam, 0 to 2 percent slopes
We	Washtenaw silt loam (where drained)
WgA	Waupecan silt loam, 0 to 2 percent slopes
WhA	Waupecan silt loam, moderately wet,
WmA	Waynetown silt loam, 0 to 2 percent slopes (where drained)
WtA	Wea silt loam, occasionally flooded
WuA	Whitaker loam, till substratum, 0 to 2 percent slopes (where drained)

TABLE 6.--ADAPTABILITY OF FOUR TILLAGE SYSTEMS

(Unless otherwise indicated, ratings are for corn or for soybeans in a rotation system where soybeans follow corn. See text for explanations of some of the terminology used in this table. Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Limitations: Moderate	Limitations: Severe	Moldboard: Fall	Moldboard: Spring	Chisel: Fall	Chisel: Spring	No-till: Slot-plant	No-till: Residue-cleared rows	Ridge-till
Am------------- Allison	---	---	Poor	Good	Good	Good	Good	Good	Good.
Ap------------- Allison	Flooding	---	Poor	Good	Fair	Good	Good	Good	Good.
AtB2----------- Alvin-Spinks	Erodes easily	Soil blowing	Poor	Fair*	Fair*	Good*	Good	Good	Good.
Ba------------- Battleground	---	---	Poor	Good	Good	Good	Good	Good	Good.
Bb------------- Battleground	Flooding	---	Poor	Good	Fair	Good	Good	Good	Good.
BgA------------ Beecher	Wetness	---	Good	Good	Good	Fair	Fair**	Good	Good.
BlA------------ Billett	Soil blowing	---	Fair*	Good*	Good*	Good*	Good	Good	Good.
BlB2----------- Billett	Erodes easily, soil blowing.	---	Poor	Good*	Good*	Good*	Good	Good	Good.
BmA------------ Billett	Soil blowing	---	Fair*	Good*	Good*	Good*	Good	Good	Good.
BnA------------ Billett	---	---	Good	Good	Good	Good	Good	Good	Good.
BnB2----------- Billett	Erodes easily	---	Fair*	Good*	Fair*	Good*	Good	Good	Good.
BoA------------ Bowes	---	---	Good	Good	Good	Good	Good	Good	Good.
BpA------------ Bowes Variant	---	---	Good	Good	Good	Good	Good	Good	Good.
CaA------------ Camden	---	---	Good	Good	Good	Good	Good	Good	Good.
CfB------------ Carmi	Erodes easily, soil blowing.	---	Poor	Good*	Good*	Good*	Good	Good	Good.
CgA------------ Carmi	---	---	Good	Good	Good	Good	Good	Good	Good.
Ck------------- Ceresco	Wetness, soil blowing.	---	Fair*	Good*	Poor	Good*	Fair**	Good	Fair.
Cl------------- Ceresco	Wetness, flooding.	---	Poor	Good	Poor	Good	Fair**	Good	Fair.

See footnotes at end of table.

TABLE 6.--ADAPTABILITY OF FOUR TILLAGE SYSTEMS--Continued

Soil name and map symbol	Limitations		Tillage system						
			Moldboard		Chisel		No-till		Ridge-till
	Moderate	Severe	Fall	Spring	Fall	Spring	Slot-plant	Residue-cleared rows	
Cm------------- Chalmers	Wetness, ponding.	---	Good	Fair	Good	Fair	Fair**	Fair**	Good.
Co------------- Cohoctah	Soil blowing	Wetness, ponding.	Poor	Good	Poor	Good	Poor**	Poor**	Good.
Cp------------- Cohoctah	---	Wetness, ponding, flooding.	Poor	Fair	Poor	Good	Poor**	Poor**	Good.
CtA------------ Crosby	Wetness	---	Good	Good	Good	Fair	Fair**	Good	Good.
CwB2----------- Crosby-Miami	Erodes easily, wetness.	---	Poor	Good*	Good*	Good*	Good	Good	Good.
DmC2----------- Desker	---	Erodes easily	Poor	Fair*	Fair*	Good*	Good	Good	Good.
DoC2----------- Desker	Soil blowing	Erodes easily	Poor	Fair*	Fair*	Good*	Good	Good	Good.
Du------------- Drummer	Wetness, ponding.	---	Good	Fair	Good	Fair	Fair**	Fair**	Good.
Dy------------- Du Page	Flooding	---	Poor	Good	Fair	Good	Good	Good	Good.
EkA------------ Elston	Soil blowing	---	Fair*	Good*	Good*	Good*	Good	Good	Good.
EmA------------ Elston	---	---	Good	Good	Good	Good	Good	Good	Good.
FcB------------ Fincastle-Crosby	Erodes easily, wetness.	---	Poor	Good*	Good*	Good*	Good	Good	Good.
Hd------------- Harpster	Wetness, ponding.	---	Good	Fair	Good	Fair	Fair**	Fair**	Good.
HfB2----------- High Gap Variant	Erodes easily	---	Poor	Good*	Good*	Good*	Good	Good	Good.
HfC2----------- High Gap Variant	---	Erodes easily	Poor	Fair*	Fair*	Good*	Good	Good	Good.
HnB, HoA------- Hononegah	---	Soil blowing	Poor	Fair*	Fair*	Good*	Good	Good	Good.
KaA------------ Kalamazoo	---	---	Good	Good	Good	Good	Good	Good	Good.
KaB2, KbB2, KcB2---------- Kalamazoo	Erodes easily	---	Fair*	Good*	Good*	Good*	Good	Good	Good.

See footnotes at end of table.

TABLE 6.--ADAPTABILITY OF FOUR TILLAGE SYSTEMS--Continued

Soil name and map symbol	Limitations		Tillage system						
			Moldboard		Chisel		No-till		Ridge-till
	Moderate	Severe	Fall	Spring	Fall	Spring	Slot-plant	Residue-cleared rows	
KcC2-----------Kalamazoo	---	Erodes easily	Poor	Fair*	Fair*	Good*	Good	Good	Good.
KpC3-----------Kosciusko	---	Erodes easily	Poor	Fair*	Fair*	Good*	Good	Good	Good.
LaA------------Lafayette	Wetness	---	Good	Good	Good	Fair	Good	Good	Good.
LeA------------La Hogue	Wetness	---	Good	Good	Good	Fair	Good	Good	Good.
Lm-------------Lash	Flooding	---	Poor	Good	Fair	Good	Good	Good	Good.
LnA------------Lauramie	---	---	Good	Good	Good	Good	Good	Good	Good.
LnB2-----------Lauramie	Erodes easily	---	Poor	Good*	Good*	Good*	Good	Good	Good.
LoA------------Linkville	---	---	Good	Good	Good	Good	Good	Good	Good.
LoB------------Linkville	Erodes easily	---	Poor	Good*	Good*	Good*	Good	Good	Good.
LvB2, LwB2-----Longlois	Erodes easily	---	Fair*	Good*	Good*	Good*	Good	Good	Good.
Mb, Mc---------Mahalasville	Ponding	Wetness	Good	Fair	Good	Fair	Fair**	Fair**	Good.
Md-------------Mahalasville-Treaty	Ponding	Wetness	Good	Fair	Good	Fair	Fair**	Fair**	Good.
MmB2-----------Marker	Erodes easily, wetness.	---	Poor	Good*	Good*	Good*	Good	Good	Good.
MoA------------Mellott	---	---	Good	Good	Good	Good	Good	Good	Good.
MsC2, MtC3-----Miami	---	Erodes easily	Poor	Fair*	Fair*	Good*	Good	Good	Good.
Mu-------------Milford	---	Wetness, ponding.	Good	Poor	Good	Poor	Poor**	Poor**	Good.
MwA------------Mulvey	Wetness	---	Good	Good	Good	Fair	Good	Good	Good.
Mz-------------Muskego	---	Wetness, ponding, soil blowing.	Poor	Good*	Poor	Good*	Poor	Fair	Poor.
OaB2-----------Oakville-Billett	Erodes easily	Soil blowing	Poor	Fair*	Fair*	Good*	Good	Good	Good.

See footnotes at end of table.

TABLE 6.--ADAPTABILITY OF FOUR TILLAGE SYSTEMS--Continued

Soil name and map symbol	Limitations		Tillage system						
			Moldboard		Chisel		No-till		Ridge-till
	Moderate	Severe	Fall	Spring	Fall	Spring	Slot-plant	Residue-cleared rows	
OgA------------ Ockley	---	---	Good	Good	Good	Good	Good	Good	Good.
OmB2----------- Octagon	Erodes easily	---	Poor	Good*	Good*	Good*	Good	Good	Good.
OmC2, OpC3----- Octagon	---	Erodes easily	Poor	Fair*	Fair*	Good*	Good	Good	Good.
Ou, Ox, Oy----- Ouiatenon	Flooding, soil blowing.	---	Poor	Good*	Fair*	Good*	Good	Good	Good.
Pc------------- Palms	---	Wetness, ponding, soil blowing.	Poor	Good*	Poor	Good*	Poor	Fair	Poor.
Pg------------- Pella	---	Wetness, ponding.	Good	Poor	Good	Poor	Poor**	Poor**	Good.
Pk------------- Peotone	---	Wetness, ponding.	Good	Poor	Good	Poor	Poor**	Poor**	Good.
PmB------------ Pinevillage	Erodes easily	---	Poor	Fair*	Fair*	Good*	Good	Good	Good.
RaB2----------- Rainsville	Erodes easily	---	Poor	Good*	Good*	Good*	Good	Good	Good.
RcA------------ Raub-Brenton	Wetness	---	Good	Good	Good	Fair	Good	Good	Good.
RdA------------ Richardville	---	---	Good	Good	Good	Good	Good	Good	Good.
RdB2----------- Richardville	Erodes easily	---	Poor	Good*	Good*	Good*	Good	Good	Good.
RdC2----------- Richardville	---	Erodes easily	Poor	Fair*	Fair*	Good*	Good	Good	Good.
RoB------------ Rockfield	Erodes easily	---	Fair	Good*	Good*	Good*	Good	Good	Good.
Rz------------- Ross	---	---	Poor	Good	Good	Good	Good	Good	Good.
Sd------------- Saranac	---	Wetness, ponding, flooding.	Poor	Fair	Poor	Good	Poor**	Poor**	Good.
Sf------------- Sawabash	---	Wetness, ponding, flooding.	Poor	Fair	Poor	Good	Poor**	Poor**	Good.
ShB------------ Shadeland	Wetness	---	Good	Good	Good	Fair	Good	Good	Good.
SmA------------ Sleeth	Wetness	---	Good	Good	Good	Fair	Good	Good	Good.

See footnotes at end of table.

TABLE 6.--ADAPTABILITY OF FOUR TILLAGE SYSTEMS--Continued

Soil name and map symbol	Limitations		Tillage system						
			Moldboard		Chisel		No-till		Ridge-till
	Moderate	Severe	Fall	Spring	Fall	Spring	Slot-plant	Residue-cleared rows	
Sn-------------- Sloan	---	Wetness, ponding, flooding.	Poor	Fair	Poor	Good	Poor**	Poor**	Good.
So-------------- Sloan Variant	---	Wetness, ponding, flooding.	Poor	Fair	Poor	Good	Poor**	Poor**	Good.
SrB------------- Sparta	---	Soil blowing	Poor	Fair*	Fair*	Good*	Good	Good	Good.
StC------------- Spinks	---	Soil blowing	Poor	Fair*	Fair*	Good*	Good	Good	Good.
SwA------------- Starks-Fincastle	Wetness	---	Good	Good	Good	Fair	Good	Good	Good.
TbA------------- Tecumseh	---	---	Good	Good	Good	Good	Good	Good	Good.
TcA------------- Thackery	---	---	Good	Good	Good	Good	Good	Good	Good.
TfB------------- Throckmorton	Erodes easily	---	Fair	Good*	Good*	Good*	Good	Good	Good.
Tg-------------- Tice	Wetness, flooding.	---	Poor	Good	Poor	Good	Fair**	Good	Good.
TmA------------- Toronto-Millbrook	Wetness	---	Good	Good	Good	Fair	Good	Good	Good.
TnB2------------ Toronto-Octagon	Erodes easily, wetness.	---	Poor	Good*	Good*	Good*	Good	Good	Good.
TtA------------- Troxel	Ponding	---	Good	Good	Good	Good	Good	Good	Good.
Wb-------------- Wallkill	---	Wetness, ponding.	Good	Poor	Good	Poor	Poor**	Poor**	Good.
We-------------- Washtenaw	Wetness, ponding.	---	Good	Poor	Good	Poor	Poor**	Poor**	Good.
WgA, WhA-------- Waupecan	---	---	Good	Good	Good	Good	Good	Good	Good.
WmA------------- Waynetown	Wetness	---	Good	Good	Good	Fair	Good	Good	Good.
WtA------------- Wea	Flooding	---	Poor	Good	Fair	Good	Good	Good	Good.

See footnotes at end of table.

TABLE 6.--ADAPTABILITY OF FOUR TILLAGE SYSTEMS--Continued

Soil name and map symbol	Limitations		Tillage system						
			Moldboard		Chisel		No-till		Ridge-till
	Moderate	Severe	Fall	Spring	Fall	Spring	Slot-plant	Residue-cleared rows	
WuA------------ Whitaker	Wetness	---	Good	Good	Good	Fair	Good	Good	Good.

* If the new crop is planted in soybean residue instead of corn residue, the ratings for moldboard plowing and chisel plowing should be interpreted as one level lower--for example, a rating of "Fair" should be interpreted as "Poor" and a rating of "Good" should be interpreted as "Fair." Tillage of soybean residue results in an amount of surface cover that does not adequately reduce the hazard of erosion.

** If the new crop is planted in soybean residue instead of corn residue, the ratings for no-till planting should be interpreted as one level higher--for example, a rating of "Fair" should be interpreted as "Good" and a rating of "Poor" should be interpreted as "Fair." Soybeans leave less residue than corn, and thus the soil is allowed to warm up more quickly.

TABLE 7.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Bromegrass-alfalfa hay	Tall fescue
		Bu	Bu	Bu	Tons	AUM*
Am------------------------ Allison	I	140	49	56	4.6	9.2
Ap------------------------ Allison	IIw	140	49	56	4.6	9.2
AtB2---------------------- Alvin-Spinks	IIe	90	32	36	3.0	6.0
Ba------------------------ Battleground	I	125	44	50	4.1	8.2
Bb------------------------ Battleground	IIw	125	44	50	4.1	8.2
BgA----------------------- Beecher	IIw	110	39	50	3.6	7.2
BkF----------------------- Berks	VIIe	---	---	---	---	---
BlA----------------------- Billett	IIIs	95	33	38	3.1	6.2
BlB2---------------------- Billett	IIIe	90	32	36	3.0	6.0
BmA----------------------- Billett	IIIs	100	35	40	3.3	6.6
BnA----------------------- Billett	IIIs	85	30	34	2.8	5.6
BnB2---------------------- Billett	IIIe	85	30	34	2.8	5.6
BoA----------------------- Bowes	I	125	44	50	4.1	8.2
BpA----------------------- Bowes Variant	I	125	44	50	4.1	8.2
CaA----------------------- Camden	I	125	44	50	4.1	8.2
CfB----------------------- Carmi	IIe	80	28	32	2.6	5.2
CgA----------------------- Carmi	IIs	90	32	36	3.0	6.0
Ck------------------------ Ceresco	IIw	90	32	36	3.0	6.0
Cl------------------------ Ceresco	IIw	95	33	38	3.1	6.2

See footnote at end of table.

TABLE 7.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Bromegrass-alfalfa hay	Tall fescue
		Bu	Bu	Bu	Tons	AUM*
Cm----------------------- Chalmers	IIw	150	53	60	5.0	10.0
Co----------------------- Cohoctah	IIIw	95	33	38	3.1	6.2
Cp----------------------- Cohoctah	IIIw	100	35	40	3.3	6.6
CrC---------------------- Coloma	VIs	---	---	---	---	---
CtA---------------------- Crosby	IIw	120	42	54	4.0	8.0
CwB2--------------------- Crosby-Miami	IIe	110	39	50	3.6	7.2
DmC2--------------------- Desker	IIIe	65	23	33	2.1	4.2
DoC2--------------------- Desker	IIIe	60	21	30	2.0	4.0
DpD2--------------------- Desker-Rodman	IVe	45	16	23	1.5	3.0
Du----------------------- Drummer	IIw	155	54	62	5.1	10.2
Dy----------------------- Du Page	IIw	125	44	50	4.1	8.2
EkA---------------------- Elston	IIs	75	26	30	2.5	5.0
EmA---------------------- Elston	IIs	90	32	36	3.0	6.0
FcB---------------------- Fincastle-Crosby	IIe	125	44	50	4.1	8.2
Hd----------------------- Harpster	IVw	60	21	---	2.0	4.0
HfB2--------------------- High Gap Variant	IIe	85	30	34	2.8	5.6
HfC2--------------------- High Gap Variant	IIIe	75	26	30	2.5	5.0
HnB---------------------- Hononegah	IVs	55	19	25	1.8	3.6
HoA---------------------- Hononegah	IVs	60	21	27	2.0	4.0
Hv----------------------- Houghton	Vw	---	---	---	---	---

See footnote at end of table.

TABLE 7.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Bromegrass-alfalfa hay	Tall fescue
		Bu	Bu	Bu	Tons	AUM*
KaA----------------------- Kalamazoo	IIs	90	32	36	3.0	6.0
KaB2, KbB2, KcB2---------- Kalamazoo	IIe	85	30	34	2.8	5.6
KcC2---------------------- Kalamazoo	IIIe	75	26	30	2.5	5.0
KoD2---------------------- Kosciusko	IVe	60	21	30	2.0	4.0
KpC3---------------------- Kosciusko	IVe	65	23	33	2.1	4.2
LaA----------------------- Lafayette	IIw	140	49	56	4.6	9.2
LeA----------------------- La Hogue	IIw	130	46	52	4.3	8.6
Lm------------------------ Lash	IIw	95	33	---	3.1	6.2
LnA----------------------- Lauramie	I	125	44	50	4.1	8.2
LnB2---------------------- Lauramie	IIe	120	42	48	4.0	8.0
LoA----------------------- Linkville	I	130	46	52	4.3	8.6
LoB----------------------- Linkville	IIe	130	46	52	4.3	8.6
LvB2, LwB2---------------- Longlois	IIe	110	39	44	3.6	7.2
Mb------------------------ Mahalasville	IIw	155	54	62	5.1	10.2
Mc------------------------ Mahalasville	IIw	150	53	60	5.0	10.0
Md------------------------ Mahalasville-Treaty	IIw	153	54	61	5.0	10.0
MmB2---------------------- Marker	IIe	110	39	50	3.6	7.2
MoA----------------------- Mellott	I	125	44	50	4.1	8.2
MsC2---------------------- Miami	IIIe	95	33	43	3.1	6.2
MsD2---------------------- Miami	IVe	80	28	36	2.6	5.2

See footnote at end of table.

TABLE 7.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Bromegrass-alfalfa hay	Tall fescue
		Bu	Bu	Bu	Tons	AUM*
MtC3 Miami	IVe	90	32	40	3.0	6.0
MtD3 Miami	VIe	---	---	---	2.5	5.0
Mu Milford	IVw	60	21	---	2.0	4.0
MwA Mulvey	IIw	125	44	50	4.1	8.2
Mz Muskego	IVw	110	39	---	3.6	7.2
OaB2 Oakville-Billett	IVs	70	25	32	2.3	4.6
OgA Ockley	I	110	39	44	3.6	7.2
OmB2 Octagon	IIe	110	39	50	3.6	7.2
OmC2 Octagon	IIIe	100	35	45	3.3	6.6
OpC3 Octagon	IVe	95	33	43	3.1	6.2
Ou Ouiatenon	IIIs	65	23	---	2.1	4.2
Ox Ouiatenon	IIIs	60	21	---	2.0	4.0
Oy Ouiatenon	IIIs	65	23	---	2.1	4.2
Pc Palms	IIIw	120	42	---	4.0	8.0
Pd Palms	Vw	---	---	---	---	---
Pg Pella	IVw	60	21	---	2.0	4.0
Pk Peotone	IVw	60	21	---	2.0	4.0
PmB Pinevillage	IVs	85	30	34	2.8	5.6
Pt. Pits						
RaB2 Rainsville	IIe	115	40	52	---	7.6

See footnote at end of table.

TABLE 7.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Bromegrass-alfalfa hay	Tall fescue
		Bu	Bu	Bu	Tons	AUM*
RcA: Raub-Brenton	IIw	140	49	56	4.6	9.2
RdA: Richardville	I	120	42	48	4.0	8.0
RdB2: Richardville	IIe	115	40	46	3.8	7.6
RdC2: Richardville	IIIe	105	37	42	3.5	7.0
RoB: Rockfield	IIe	120	42	48	4.0	8.0
RsF: Rodman	VIIs	---	---	---	---	0.2
Rz: Ross	I	135	47	54	4.5	9.0
Sd: Saranac	IIIw	130	46	---	4.3	8.6
Sf: Sawabash	IIIw	120	42	---	4.0	8.0
ShB: Shadeland	IIe	100	35	40	3.3	6.6
SmA: Sleeth	IIw	120	42	48	4.0	8.0
Sn: Sloan	IIIw	130	46	52	4.3	8.6
So: Sloan Variant	IIIw	110	39	44	3.6	7.2
SrB: Sparta	IVs	75	21	34	2.5	5.0
SrC: Sparta	VIs	---	---	---	2.5	5.0
StC: Spinks	IIIe	60	21	27	2.0	4.0
SwA: Starks-Fincastle	IIw	135	47	54	4.5	9.0-
SyF: Strawn-Rodman	VIIe	---	---	---	---	---
TbA: Tecumseh	I	130	46	52	4.3	8.6
TcA: Thackery	I	110	39	44	3.6	7.2

See footnote at end of table.

TABLE 7.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Bromegrass-alfalfa hay	Tall fescue
		Bu	Bu	Bu	Tons	AUM*
TfB----------------------- Throckmorton	IIe	125	44	50	4.1	8.2
Tg------------------------ Tice	IIIw	140	49	---	4.6	9.2
TmA----------------------- Toronto-Millbrook	IIw	135	47	54	4.5	9.0
TnB2---------------------- Toronto-Octagon	IIe	120	42	48	4.0	8.0
TtA----------------------- Troxel	I	135	47	---	4.5	9.0
Ua. Udorthents						
UbB. Urban land-Billett						
UcA. Urban land-Carmi						
UmB, UmC. Urban land-Miami						
UsA. Urban land-Starks-Fincastle						
Wb------------------------ Wallkill	IIIw	100	35	---	3.3	6.6
We------------------------ Washtenaw	IIw	130	46	52	4.3	8.6
WgA, WhA------------------ Waupecan	I	135	47	54	4.5	9.0
WmA----------------------- Waynetown	IIw	125	44	50	4.1	8.2
WtA----------------------- Wea	IIw	120	42	48	4.0	8.0
WuA----------------------- Whitaker	IIw	120	42	48	4.0	8.0

* Animal unit month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 8.--CAPABILITY CLASSES AND SUBCLASSES

(Miscellaneous areas and Urban land map units are excluded. Absence of an entry indicates no acreage)

Class	Total acreage	Major management concerns (Subclass)			
		Erosion (e)	Wetness (w)	Soil problem (s)	Climate (c)
		Acres	Acres	Acres	Acres
I	22,539	---	---	---	---
II	227,387	59,747	153,040	14,600	---
III	29,925	8,401	9,023	12,501	---
IV	12,886	4,408	4,710	3,768	---
V	585	---	585	---	---
VI	836	207	---	629	---
VII	11,302	9,172	---	2,130	---
VIII	---	---	---	---	---

TABLE 9.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
AtB2:									
Alvin	4A	Slight	Slight	Slight	Slight	White oak	80	4	Green ash, black walnut, yellow-poplar, white oak, eastern white pine, American sycamore, sugar maple.
						Northern red oak	80	4	
						Black walnut	---	---	
						Yellow-poplar	90	6	
Spinks	4S	Slight	Moderate	Moderate	Slight	Northern red oak	70	4	Eastern white pine, red pine.
						White oak	66	3	
Ba, Bb: Battleground	8A	Slight	Moderate	Slight	Slight	Yellow-poplar	100	8	Black walnut.
BgA: Beecher	4C	Slight	Slight	Slight	Severe	White oak	70	4	Eastern white pine, Scotch pine, red pine.
						Northern red oak	70	4	
						Green ash	---	---	
						Bur oak	---	---	
BkF: Berks	3R	Moderate	Severe	Moderate	Slight	Northern red oak	60	3	Virginia pine, eastern white pine, Japanese larch, red pine.
						Black oak	60	3	
						Virginia pine	60	6	
BmA: Billett	3A	Slight	Slight	Slight	Slight	Northern red oak	60	3	Red pine, eastern white pine, white spruce.
						White oak	---	---	
						Black oak	---	---	
						Northern pin oak	---	---	
						Shagbark hickory	---	---	
CaA: Camden	7A	Slight	Slight	Slight	Slight	Yellow-poplar	95	7	White oak, black walnut, green ash, eastern white pine, red pine, yellow-poplar, white ash.
						White oak	85	5	
						Northern red oak	85	5	
						Green ash	76	5	
Ck, Cl: Ceresco	4W	Slight	Moderate	Slight	Slight	Northern red oak	76	4	Eastern white pine, yellow-poplar, red maple, white ash, red pine.
						White ash	---	---	
						Red maple	---	---	
						Bur oak	---	---	
						Green ash	---	---	
						Quaking aspen	---	---	

See footnote at end of table.

TABLE 9.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
Co, Cp---------- Cohoctah	2W	Slight	Severe	Severe	Severe	Silver maple-------- Red maple----------- Eastern cottonwood-- White ash----------- Swamp white oak----- American sycamore---	80 56 --- --- --- ---	2 2 --- --- --- ---	Eastern white pine, white spruce, northern whitecedar.
CrC------------- Coloma	4S	Slight	Moderate	Moderate	Slight	Northern red oak----	70	4	Eastern white pine.
CtA------------- Crosby	4A	Slight	Slight	Slight	Slight	White oak----------- Pin oak------------- Yellow-poplar------- Northern red oak----	75 85 85 75	4 5 6 4	Eastern white pine, northern red oak, white ash, red maple, yellow-poplar, American sycamore.
CwB2:									
Crosby----------	4A	Slight	Slight	Slight	Slight	White oak----------- Pin oak------------- Yellow-poplar------- Northern red oak----	75 85 85 75	4 5 6 4	Eastern white pine, northern red oak, white ash, red maple, yellow-poplar, American sycamore.
Miami----------	5A	Slight	Slight	Slight	Slight	White oak----------- Yellow-poplar-------	90 98	5 7	Eastern white pine, red pine, white ash, yellow-poplar, black walnut.
DpD2: Desker.									
Rodman----------	4S	Slight	Slight	Severe	Slight	Northern red oak---- White oak----------- Red pine------------ Eastern white pine--	70 70 75 85	4 4 10 14	Eastern white pine, red pine, jack pine.
FcB:									
Fincastle-------	4A	Slight	Slight	Slight	Slight	Northern red oak---- White oak----------- Pin oak------------- Yellow-poplar-------	75 75 85 85	4 4 5 6	Eastern white pine, white ash, red maple, yellow-poplar, American sycamore.

See footnote at end of table.

TABLE 9.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
FcB:									
Crosby	4A	Slight	Slight	Slight	Slight	White oak	75	4	Eastern white pine, northern red oak, white ash, red maple, yellow-poplar, American sycamore.
						Pin oak	85	5	
						Yellow-poplar	85	6	
						Northern red oak	75	4	
HfB2, HfC2 High Gap Variant	6A	Slight	Slight	Slight	Slight	Yellow-poplar	85	6	Yellow-poplar, eastern white pine.
Hv Houghton	2W	Slight	Severe	Severe	Severe	White ash	51	2	---
						Red maple	51	2	
						Black willow	---	---	
						Quaking aspen	56	4	
						Silver maple	76	2	
KaA, KaB2, KbB2, KcB2, KcC2 Kalamazoo	4A	Slight	Slight	Slight	Slight	Northern red oak	65	4	Black walnut, yellow-poplar, eastern white pine, white spruce, red pine, Carolina poplar.
						White ash	65	4	
						Black walnut	65	---	
						Yellow-poplar	65	3	
						White oak	---	---	
						Black cherry	---	---	
						American basswood	65	4	
						Sugar maple	61	3	
KoD2 Kosciusko	4S	Slight	Slight	Moderate	Slight	Northern red oak	78	4	Eastern white pine, red pine, jack pine.
						White oak	76	4	
						Eastern white pine	70	10	
						Black oak	---	---	
						Jack pine	---	---	
KpC3 Kosciusko	4A	Slight	Slight	Slight	Slight	Northern red oak	78	4	Eastern white pine, red pine, jack pine.
						White oak	76	4	
						Eastern white pine	70	10	
						Black oak	---	---	
						Jack pine	---	---	
Lm Lash	8A	Slight	Moderate	Slight	Slight	Yellow-poplar	100	8	Black walnut, eastern cottonwood.
Mb, Mc Mahalasville	5W	Slight	Severe	Severe	Severe	Pin oak	85	5	Eastern white pine, red maple, white ash, silver maple.
						White oak	75	4	
Md:									
Mahalasville	5W	Slight	Severe	Severe	Severe	Pin oak	85	5	Eastern white pine, red maple, white ash.
						White oak	75	4	

See footnote at end of table.

TABLE 9.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
Md:									
Treaty	5W	Slight	Severe	Severe	Severe	Pin oak	90	5	Eastern white pine, red maple, white ash.
						White oak	75	4	
						Northern red oak	---	---	
MsC2, MsD2, MtC3, MtD3 Miami	5A	Slight	Slight	Slight	Slight	White oak	90	5	Eastern white pine, red pine, white ash, yellow-poplar, black walnut.
						Yellow-poplar	98	7	
MwA Mulvey	4A	Slight	Slight	Slight	Slight	White oak	80	4	White oak, black walnut, northern red oak.
						Northern red oak	80	4	
						Yellow-poplar	90	6	
Mz Muskego	2W	Slight	Severe	Severe	Severe	Tamarack	50	3	---
						Red maple	51	2	
						White ash	52	2	
						Green ash	---	---	
						Black willow	---	---	
						Quaking aspen	56	4	
						Silver maple	---	---	
OaB2:									
Oakville	4S	Slight	Moderate	Moderate	Slight	White oak	70	4	Eastern white pine, red pine, jack pine.
						Red pine	78	10	
						Eastern white pine	85	14	
						Jack pine	68	7	
Billett	4A	Slight	Slight	Slight	Slight	Northern red oak	60	4	Red pine, eastern white pine, white spruce.
						White oak	---	---	
						Black oak	---	---	
						Northern pin oak	---	---	
						Shagbark hickory	---	---	
OgA Ockley	5A	Slight	Slight	Slight	Slight	White oak	90	5	Eastern white pine, red pine, white ash, yellow-poplar, black walnut.
						Northern red oak	90	5	
						Yellow-poplar	98	7	
Ou, Ox, Oy Ouiatenon	6A	Slight	Slight	Slight	Slight	Yellow-poplar	90	6	Black walnut.
Pc Palms	2W	Slight	Severe	Severe	Severe	White ash	51	2	Red maple, silver maple, green ash.
						Red maple	51	2	
						Quaking aspen	56	4	
						Black willow	---	---	
						Silver maple	76	2	

See footnote at end of table.

TABLE 9.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi- nation symbol	Management concerns: Erosion hazard	Management concerns: Equip- ment limita- tion	Management concerns: Seedling mortal- ity	Management concerns: Wind- throw hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Produc- tivity class*	Trees to plant
Pd-------------- Palms	2W	Slight	Severe	Severe	Severe	Red maple-----------	51	2	Red maple, silver maple, green ash.
						Silver maple--------	76	2	
						White ash-----------	51	2	
						Quaking aspen-------	56	4	
PmB------------- Pinevillage	3F	Slight	Moderate	Severe	Slight	Sugar maple---------	60	3	Green ash, eastern white pine, yellow-poplar, American sycamore.
						Black walnut--------	---	---	
						American sycamore---	---	---	
						Hackberry-----------	---	---	
RaB2------------ Rainsville	5A	Slight	Slight	Slight	Slight	White oak-----------	88	5	White oak, yellow-poplar, northern red oak, white ash, green ash, eastern white pine, black cherry, black walnut.
						Yellow-poplar-------	98	7	
						Northern red oak----	90	5	
						Shagbark hickory----	---	---	
RdA, RdB2, RdC2- Richardville	7A	Slight	Slight	Slight	Slight	Yellow-poplar-------	94	7	Eastern white pine, white ash, yellow-poplar, black walnut.
						Northern red oak----	90	5	
						Black oak-----------	88	5	
						White oak-----------	85	5	
RoB------------- Rockfield	8A	Slight	Slight	Slight	Slight	Yellow-poplar-------	105	8	Eastern white pine, yellow-poplar, white oak, black walnut, green ash, white ash.
						White ash-----------	85	6	
RsF------------- Rodman	4R	Severe	Severe	Severe	Slight	Northern red oak----	70	4	Eastern white pine, red pine, jack pine.
						White oak-----------	70	4	
						Red pine------------	75	10	
						Eastern white pine--	85	14	
Rz-------------- Ross	5A	Slight	Slight	Slight	Slight	Northern red oak----	86	5	Eastern white pine, black walnut, white ash, yellow-poplar.
						Yellow-poplar-------	96	7	
						Sugar maple---------	85	4	
						White oak-----------	---	---	
						Black walnut--------	---	---	
						Black cherry--------	---	---	
						White ash-----------	---	---	
Sd-------------- Saranac	5W	Slight	Severe	Moderate	Moderate	Pin oak-------------	85	5	Eastern white pine, red maple, white ash.
						Red maple-----------	---	---	
						Bur oak-------------	---	---	
						White ash-----------	---	---	
Sf-------------- Sawabash	5W	Slight	Severe	Severe	Slight	Pin oak-------------	86	5	Green ash, American sycamore.
						American sycamore---	---	---	

See footnote at end of table.

TABLE 9.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
ShB------------- Shadeland	4A	Slight	Moderate	Slight	Slight	White oak-----------	75	4	Eastern white pine, white ash, yellow-poplar, swamp white oak, pin oak.
						Pin oak-------------	85	5	
						Yellow-poplar-------	85	6	
SmA------------- Sleeth	5A	Slight	Slight	Slight	Slight	Pin oak-------------	85	5	Eastern white pine, white ash, red maple, yellow-poplar, American sycamore.
						Yellow-poplar-------	85	6	
						White oak-----------	70	4	
Sn-------------- Sloan	5W	Slight	Severe	Moderate	Moderate	Pin oak-------------	86	5	Red maple, green ash, eastern cottonwood, pin oak, swamp white oak, silver maple, American sycamore.
						Swamp white oak-----	---	---	
						Red maple-----------	---	---	
						Green ash-----------	---	---	
						Eastern cottonwood--	---	---	
So-------------- Sloan Variant	2W	Slight	Severe	Severe	Slight	Pin oak-------------	36	2	Red maple, eastern white pine.
						Swamp white oak-----	---	---	
SrB, SrC-------- Sparta	4S	Slight	Slight	Severe	Slight	Northern red oak----	70	4	Red pine, eastern white pine, jack pine.
						Eastern white pine--	---	---	
						Red pine------------	---	---	
						Jack pine-----------	---	---	
StC------------- Spinks	4S	Slight	Moderate	Moderate	Slight	Northern red oak----	70	4	Eastern white pine, red pine.
						White oak-----------	66	3	
SwA:									
Starks---------	4A	Slight	Slight	Slight	Slight	White oak-----------	80	4	Sugar maple, American sycamore, yellow-poplar, white oak, green ash.
						Northern red oak----	80	4	
						Yellow-poplar-------	90	6	
						Black walnut--------	---	---	
Fincastle------	4A	Slight	Slight	Slight	Slight	Northern red oak----	75	4	Eastern white pine, white ash, red maple, yellow-poplar, American sycamore.
						White oak-----------	75	4	
						Pin oak-------------	85	5	
						Yellow-poplar-------	85	6	

See footnote at end of table.

TABLE 9.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
SyF:									
Strawn----------	4R	Severe	Severe	Moderate	Slight	White oak-----------	80	4	White oak, black walnut, northern red oak, green ash, eastern white pine, red pine, sugar maple.
						Northern red oak----	80	4	
						Yellow-poplar-------	90	6	
						Black walnut--------	---	---	
Rodman----------	4R	Moderate	Moderate	Severe	Slight	Northern red oak----	70	4	Eastern white pine, red pine, jack pine.
						White oak-----------	70	4	
						Red pine------------	75	10	
						Eastern white pine--	85	14	
TcA------------- Thackery	5A	Slight	Slight	Slight	Slight	Northern red oak----	90	5	Eastern white pine, black walnut, yellow-poplar, white ash, red pine, northern red oak, white oak, green ash, black cherry, American sycamore, eastern cottonwood.
						White oak-----------	90	5	
						Black walnut--------	---	---	
						Black cherry--------	---	---	
						Sugar maple---------	---	---	
						White ash-----------	---	---	
						Yellow-poplar-------	---	---	
Tg-------------- Tice	5A	Slight	Slight	Slight	Slight	Pin oak-------------	96	5	American sycamore, eastern cottonwood, green ash, yellow-poplar, red maple, cherrybark oak.
						Yellow-poplar-------	90	6	
						Virginia pine-------	90	9	
						Eastern cottonwood--	---	---	
						White ash-----------	---	---	
TmA:									
Toronto.									
Millbrook-------	4A	Slight	Slight	Slight	Slight	White oak-----------	80	4	White oak, black walnut, northern red oak, green ash, sugar maple.
						Northern red oak----	80	4	
						Yellow-poplar-------	90	6	
						Black walnut--------	---	---	
Wb-------------- Wallkill	2W	Slight	Severe	Severe	Severe	White ash-----------	52	2	Green ash, silver maple, swamp white oak, pin oak.
						Eastern cottonwood--	---	---	
						Silver maple--------	---	---	
						Black willow--------	---	---	
						Green ash-----------	---	---	

See footnote at end of table.

TABLE 9.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
We---------------- Washtenaw	5W	Slight	Severe	Severe	Moderate	Pin oak------------- Northern red oak---- Red maple----------- Silver maple-------- White ash----------- American basswood--- White oak-----------	86 75 70 --- --- --- ---	5 4 3 --- --- --- ---	Eastern white pine, black spruce, red maple, green ash, white spruce.
WmA------------- Waynetown	5A	Slight	Slight	Slight	Slight	Pin oak------------- Yellow-poplar------- White oak-----------	85 85 75	5 6 4	Eastern white pine, green ash, red maple, yellow-poplar, American sycamore.
WuA------------- Whitaker	4A	Slight	Slight	Slight	Slight	White oak----------- Pin oak------------- Yellow-poplar------- Northern red oak----	70 85 85 75	4 5 6 4	Eastern white pine, white ash, red maple, yellow-poplar, American sycamore.

* Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

TABLE 10.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

(The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil)

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
Am, Ap: Allison	---	American cranberrybush, Amur honeysuckle, Amur privet, silky dogwood.	Blue spruce, northern whitecedar, Austrian pine, Washington hawthorn, white fir.	Norway spruce	Eastern white pine, pin oak.
AtB2:					
Alvin	---	Amur privet, Washington hawthorn, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, northern whitecedar, Osage-orange, eastern redcedar.	Eastern white pine, red pine, Norway spruce.	---
Spinks	---	Washington hawthorn, Amur privet, Amur honeysuckle, American cranberrybush.	Austrian pine, eastern redcedar, northern whitecedar, Osage-orange.	Eastern white pine, Norway spruce, red pine.	---
Ba, Bb: Battleground	---	Siberian peashrub	White spruce, green ash, Osage-orange, eastern redcedar, northern whitecedar, Washington hawthorn, nannyberry viburnum.	Black willow	---
BgA: Beecher	---	Washington hawthorn, Amur privet, eastern redcedar, Amur honeysuckle, American cranberrybush, arrowwood.	Austrian pine, green ash, Osage-orange.	Eastern white pine, pin oak.	---
BkF: Berks	Siberian peashrub	Tatarian honeysuckle, Amur honeysuckle, lilac, autumn-olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---

TABLE 10.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
BlA, BlB2--------- Billett	---	Amur honeysuckle, Amur privet, American cranberrybush, Washington hawthorn.	Austrian pine, Osage-orange, eastern redcedar, northern whitecedar.	Eastern white pine, red pine, Norway spruce.	---
BmA--------------- Billett	Lilac-------------	Russian-olive, Siberian peashrub, eastern redcedar.	Eastern white pine, honeylocust, hackberry, red pine, Norway spruce, green ash, Amur maple.	---	---
BnA, BnB2--------- Billett	---	Amur honeysuckle, Amur privet, American cranberrybush, Washington hawthorn.	Austrian pine, Osage-orange, eastern redcedar, northern whitecedar.	Eastern white pine, red pine, Norway spruce.	---
BoA--------------- Bowes	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
BpA--------------- Bowes Variant	---	Amur privet, American cranberrybush, Amur honeysuckle, silky dogwood.	White fir, Washington hawthorn, blue spruce, Austrian pine, northern whitecedar.	Norway spruce-----	Eastern white pine, pin oak.
CaA--------------- Camden	---	Amur honeysuckle, Amur privet, silky dogwood, American cranberrybush.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
CfB, CgA---------- Carmi	Siberian peashrub	Eastern redcedar, radiant crabapple, Washington hawthorn, autumn-olive, Amur honeysuckle, lilac, silky dogwood.	Eastern white pine, Austrian pine, red pine, jack pine.	---	---
Ck, Cl------------ Ceresco	---	Amur privet, silky dogwood, American cranberrybush, Amur honeysuckle.	Northern whitecedar, white fir, blue spruce, Washington hawthorn, Austrian pine.	Norway spruce-----	Pin oak, eastern white pine.

TABLE 10.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
Cm----------------- Chalmers	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern whitecedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
Co, Cp------------ Cohoctah	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Northern whitecedar, Norway spruce, Austrian pine, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
CrC---------------- Coloma	Siberian peashrub	Eastern redcedar, radiant crabapple, Washington hawthorn, autumn-olive, Amur honeysuckle, lilac, silky dogwood.	Austrian pine, jack pine, red pine.	Eastern white pine	---
CtA---------------- Crosby	---	Arrowwood, eastern redcedar, Washington hawthorn, Amur honeysuckle, American cranberrybush, Amur privet.	Austrian pine, green ash, Osage-orange.	Eastern white pine, pin oak.	---
CwB2:					
Crosby-----------	---	Arrowwood, eastern redcedar, Washington hawthorn, Amur honeysuckle, American cranberrybush, Amur privet.	Austrian pine, green ash, Osage-orange.	Eastern white pine, pin oak.	---
Miami------------	---	Amur honeysuckle, Amur privet, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
DmC2, DoC2-------- Desker	---	Amur privet, Washington hawthorn, Amur honeysuckle, American cranberrybush.	Austrian pine, eastern redcedar, northern whitecedar, Osage-orange.	Eastern white pine, Norway spruce, red pine.	---

TABLE 10.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
DpD2:					
Desker-----------	---	Amur privet, Washington hawthorn, Amur honeysuckle, American cranberrybush.	Austrian pine, eastern redcedar, northern whitecedar, Osage-orange.	Eastern white pine, Norway spruce, red pine.	---
Rodman-----------	Siberian peashrub	Silky dogwood, gray dogwood, Amur honeysuckle, autumn-olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Black locust, jack pine, Virginia pine.	---	---
Du:					
Drummer----------	---	American cranberrybush, Amur honeysuckle, silky dogwood, Amur privet.	Norway spruce, Washington hawthorn, white fir, blue spruce, northern whitecedar, Austrian pine.	Eastern white pine	Pin oak.
Drummer, stratified sandy substratum------	---	American cranberrybush, Amur honeysuckle, silky dogwood, Amur privet.	Norway spruce, Washington hawthorn, white fir, blue spruce, northern whitecedar, Austrian pine.	Eastern white pine	Pin oak.
Dy---------------- Du Page	---	Siberian peashrub	Green ash, Osage-orange, eastern redcedar, northern whitecedar, white spruce, nannyberry viburnum, Washington hawthorn.	Black willow------	---
EkA, EmA---------- Elston	---	Amur privet, Washington hawthorn, Amur honeysuckle, American cranberrybush.	Austrian pine, eastern redcedar, northern whitecedar, Osage-orange.	Eastern white pine, Norway spruce, red pine.	---
FcB:					
Fincastle--------	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.

TABLE 10.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
FcB:					
Crosby	---	Arrowwood, eastern redcedar, Washington hawthorn, Amur honeysuckle, American cranberrybush, Amur privet.	Austrian pine, green ash, Osage-orange.	Eastern white pine, pin oak.	---
Hd Harpster	---	Nannyberry viburnum, Washington hawthorn.	White spruce, northern whitecedar, eastern redcedar, green ash, Osage-orange.	Black willow	---
HfB2, HfC2 High Gap Variant	Siberian peashrub	Eastern redcedar, radiant crabapple, Washington hawthorn, autumn-olive, Amur honeysuckle, lilac.	Eastern white pine, Austrian pine, red pine, jack pine.	---	---
HnB, HoA Hononegah	Gray dogwood, Siberian peashrub.	Eastern redcedar, radiant crabapple, Washington hawthorn, autumn-olive, Amur honeysuckle, lilac.	Austrian pine, jack pine, red pine.	Eastern white pine	---
Hv. Houghton					
KaA, KaB2, KbB2, KcB2, KcC2 Kalamazoo	---	Lilac, American cranberrybush, Siberian peashrub, silky dogwood, nannyberry viburnum, eastern redcedar.	Red pine, jack pine, green ash.	Eastern white pine, Norway spruce.	Carolina poplar.
KoD2 Kosciusko	Siberian peashrub	Eastern redcedar, lilac, radiant crabapple, autumn-olive, Amur honeysuckle, Washington hawthorn.	Eastern white pine, red pine, Austrian pine, jack pine.	---	---

TABLE 10.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
KpC3: Kosciusko	Siberian peashrub	Lilac, Amur honeysuckle, autumn-olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, red pine, eastern white pine, Austrian pine, black locust.	---	---
LaA: Lafayette	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
LeA: La Hogue	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
Lm: Lash	---	Siberian peashrub	Green ash, Osage-orange, eastern redcedar, northern whitecedar, white spruce, nannyberry viburnum, Washington hawthorn.	Black willow	---
LnA, LnB2: Lauramie	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, Washington hawthorn, northern whitecedar.	Austrian pine, Norway spruce.	Eastern white pine, pin oak.
LoA, LoB: Linkville	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
LvB2, LwB2: Longlois	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
Mb, Mc: Mahalasville	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern whitecedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.

TABLE 10.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
Md:					
Mahalasville-----	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern whitecedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
Treaty-----------	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern whitecedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
MmB2-------------- Marker	---	Eastern redcedar, arrowwood, Washington hawthorn, Amur privet, Amur honeysuckle, American cranberrybush.	Green ash, Austrian pine, Osage-orange.	Eastern white pine, pin oak.	---
MoA--------------- Mellott	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
MsC2, MsD2, MtC3, MtD3------------- Miami	---	Amur honeysuckle, Amur privet, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
Mu---------------- Milford	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern whitecedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
MwA--------------- Mulvey	---	Amur privet, American cranberrybush, Amur honeysuckle, silky dogwood.	Austrian pine, white fir, northern whitecedar, blue spruce, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
Mz---------------- Muskego	Whitebelle honeysuckle, common ninebark.	Amur privet, nannyberry viburnum, silky dogwood, Amur honeysuckle.	Tall purple willow	Golden willow, black willow.	Imperial Carolina poplar.

TABLE 10.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
OaB2:					
Oakville	Siberian peashrub	Eastern redcedar, lilac, radiant crabapple, autumn-olive, Washington hawthorn, Amur honeysuckle.	Red pine, Austrian pine, jack pine.	Eastern white pine	---
Billett	Lilac	Russian-olive, Siberian peashrub, eastern redcedar.	Eastern white pine, honeylocust, hackberry, red pine, Norway spruce, green ash, Amur maple.	---	---
OgA Ockley	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
OmB2, OmC2, OpC3 Octagon	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
Ou, Ox, Oy Ouiatenon	---	Siberian peashrub	Green ash, Osage-orange, eastern redcedar, northern whitecedar, white spruce, nannyberry viburnum, Washington hawthorn.	Black willow	---
Pc Palms	Whitebelle honeysuckle, common ninebark.	Amur honeysuckle, Amur privet, silky dogwood, nannyberry viburnum.	Tall purple willow	Golden willow, black willow.	Imperial Carolina poplar.
Pd. Palms					
Pg Pella	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern whitecedar, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.

TABLE 10.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
Pk: Peotone	---	Amur privet, American cranberrybush.	Norway spruce, Austrian pine, northern whitecedar, Washington hawthorn.	Eastern white pine	Pin oak.
PmB: Pinevillage	---	Siberian peashrub	Green ash, Osage-orange, eastern redcedar, northern whitecedar, white spruce, nannyberry viburnum, Washington hawthorn.	Black willow	---
Pt. Pits					
RaB2: Rainsville	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
RcA:					
Raub	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
Brenton	---	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
RdA, RdB2, RdC2: Richardville	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
RoB: Rockfield	Silky dogwood	Amur honeysuckle, American cranberrybush, Amur privet.	Austrian pine, northern whitecedar, white fir, Washington hawthorn, blue spruce.	Norway spruce	Eastern white pine, pin oak.

TABLE 10.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
RsF: Rodman	Siberian peashrub	Silky dogwood, gray dogwood, Amur honeysuckle, autumn-olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Black locust, jack pine, Virginia pine.	---	---
Rz: Ross	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, northern whitecedar, blue spruce, white fir, Austrian pine.	Norway spruce	Pin oak, eastern white pine.
Sd: Saranac	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	Austrian pine, white fir, northern whitecedar, Washington hawthorn, Norway spruce, blue spruce.	Eastern white pine	Pin oak.
Sf: Sawabash	---	Washington hawthorn, nannyberry viburnum.	Osage-orange, green ash, northern whitecedar, eastern redcedar, white spruce.	Black willow	---
ShB: Shadeland	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
SmA: Sleeth	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
Sn: Sloan	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Northern whitecedar, Norway spruce, Austrian pine, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.

TABLE 10.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
So-----------------Sloan Variant	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern whitecedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
SrB, SrC----------Sparta	Siberian peashrub	Amur honeysuckle, lilac, eastern redcedar, radiant crabapple, Washington hawthorn, autumn-olive.	Red pine, jack pine, Austrian pine.	Eastern white pine	---
StC----------------Spinks	---	Washington hawthorn, Amur privet, Amur honeysuckle, American cranberrybush.	Austrian pine, eastern redcedar, northern whitecedar, Osage-orange.	Eastern white pine, Norway spruce, red pine.	---
SwA:					
Starks------------	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
Fincastle---------	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
SyF:					
Strawn.					
Rodman------------	Siberian peashrub	Silky dogwood, gray dogwood, Amur honeysuckle, autumn-olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Black locust, jack pine, Virginia pine.	---	---
TbA----------------Tecumseh	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
TcA----------------Thackery	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn, Austrian pine.	Norway spruce-----	Eastern white pine, pin oak.

TABLE 10.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
TfB: Throckmorton	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
Tg: Tice	---	Silky dogwood, Amur privet, American cranberrybush, Amur honeysuckle.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
TmA:					
Toronto	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
Millbrook	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
TnB2:					
Toronto	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
Octagon	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
TtA: Troxel	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
Ua. Udorthents					
UbB: Urban land.					
Billett	---	Amur honeysuckle, Amur privet, American cranberrybush, Washington hawthorn.	Austrian pine, Osage-orange, eastern redcedar, northern whitecedar.	Eastern white pine, red pine, Norway spruce.	---

TABLE 10.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
UcA:					
Urban land.					
Carmi	Siberian peashrub	Eastern redcedar, radiant crabapple, Washington hawthorn, autumn-olive, Amur honeysuckle, lilac, silky dogwood.	Eastern white pine, Austrian pine, red pine, jack pine.	---	---
UmB, UmC:					
Urban land.					
Miami	---	Amur honeysuckle, Amur privet, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
UsA:					
Urban land.					
Starks	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
Fincastle	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
Wb: Wallkill	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern whitecedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
We: Washtenaw	---	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	Northern whitecedar, Norway spruce, Austrian pine, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
WgA, WhA: Waupecan	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, northern whitecedar, blue spruce, white fir.	Austrian pine, Norway spruce.	Pin oak, eastern white pine.

TABLE 10.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
WmA--------------- Waynetown	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
WtA--------------- Wea	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	White fir, northern whitecedar, blue spruce, Washington hawthorn.	Norway spruce, Austrian pine.	Pin oak, eastern white pine.
WuA--------------- Whitaker	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.

TABLE 11.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Am: Allison	Severe: flooding.	Slight	Slight	Slight	Slight.
Ap: Allison	Severe: flooding.	Moderate: flooding.	Slight	Moderate: flooding.	Severe: flooding.
AtB2:					
Alvin	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
Spinks	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
Ba: Battleground	Severe: flooding.	Slight	Slight	Slight	Slight.
Bb: Battleground	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
BgA: Beecher	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
BkF: Berks	Severe: slope, small stones.	Severe: small stones, slope.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
BlA: Billett	Slight	Slight	Slight	Slight	Slight.
BlB2: Billett	Slight	Slight	Moderate: slope.	Slight	Slight.
BmA: Billett	Slight	Slight	Slight	Slight	Moderate: droughty.
BnA: Billett	Slight	Slight	Slight	Slight	Slight.
BnB2: Billett	Slight	Slight	Moderate: slope.	Slight	Slight.
BoA: Bowes	Slight	Slight	Slight	Slight	Slight.
BpA: Bowes Variant	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight	Slight.
CaA: Camden	Slight	Slight	Slight	Severe: erodes easily.	Slight.
CfB: Carmi	Slight	Slight	Moderate: slope.	Slight	Slight.
CgA: Carmi	Slight	Slight	Slight	Slight	Slight.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Ck: Ceresco	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Cl: Ceresco	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, flooding.
Cm: Chalmers	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Co, Cp: Cohoctah	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
CrC: Coloma	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty.
CtA: Crosby	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
CwB2:					
Crosby	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Miami	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.
DmC2: Desker	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, droughty, slope.
DoC2: Desker	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: droughty, slope.
DpD2:					
Desker	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Rodman	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: droughty, slope.
Du:					
Drummer	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Drummer, stratified sandy substratum	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Dy: Du Page	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
EkA, EmA: Elston	Slight	Slight	Slight	Slight	Slight.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
FcB:					
Fincastle	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Crosby	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Hd Harpster	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
HfB2 High Gap Variant	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, thin layer.	Slight	Moderate: thin layer, area reclaim.
HfC2 High Gap Variant	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer, area reclaim.
HnB Hononegah	Slight	Slight	Moderate: slope, small stones.	Slight	Severe: droughty.
HoA Hononegah	Slight	Slight	Moderate: small stones.	Slight	Moderate: droughty.
Hv Houghton	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
KaA, KaB2 Kalamazoo	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones.
KbB2, KcB2 Kalamazoo	Slight	Slight	Moderate: slope.	Severe: erodes easily.	Slight.
KcC2 Kalamazoo	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
KoD2 Kosciusko	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
KpC3 Kosciusko	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, droughty, slope.
LaA Lafayette	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
LeA La Hogue	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Lm Lash	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
LnA Lauramie	Slight	Slight	Slight	Slight	Slight.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
LnB2------------------ Lauramie	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
LoA------------------- Linkville	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
LoB------------------- Linkville	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
LvB2, LwB2------------ Longlois	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
Mb, Mc---------------- Mahalasville	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Md:					
Mahalasville---------	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Treaty---------------	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
MmB2------------------ Marker	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
MoA------------------- Mellott	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
MsC2------------------ Miami	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
MsD2------------------ Miami	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
MtC3------------------ Miami	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
MtD3------------------ Miami	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Mu-------------------- Milford	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
MwA------------------- Mulvey	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Mz-------------------- Muskego	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
OaB2:					
Oakville-------------	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Moderate: droughty.
Billett--------------	Slight----------	Slight----------	Moderate: slope.	Slight----------	Moderate: droughty.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
OgA------------------- Ockley	Slight----------	Slight----------	Moderate: small stones.	Slight----------	Slight.
OmB2------------------ Octagon	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight----------	Slight.
OmC2, OpC3------------ Octagon	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight----------	Moderate: slope.
Ou-------------------- Ouiatenon	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
Ox-------------------- Ouiatenon	Severe: flooding.	Slight----------	Moderate: small stones, flooding.	Slight----------	Moderate: droughty, flooding.
Oy-------------------- Ouiatenon	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
Pc, Pd---------------- Palms	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
Pg-------------------- Pella	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Pk-------------------- Peotone	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
PmB------------------- Pinevillage	Severe: flooding.	Moderate: small stones.	Severe: small stones.	Slight----------	Moderate: small stones, large stones, droughty.
Pt. Pits					
RaB2------------------ Rainsville	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
RcA:					
Raub-----------------	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Brenton--------------	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
RdA------------------- Richardville	Slight----------	Slight----------	Slight----------	Severe: erodes easily.	Slight.
RdB2------------------ Richardville	Slight----------	Slight----------	Moderate: slope.	Severe: erodes easily.	Slight.
RdC2------------------ Richardville	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
RoB------------------- Rockfield	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
RsF: Rodman	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: droughty, slope.
Rz: Ross	Severe: flooding.	Slight	Slight	Slight	Slight.
Sd: Saranac	Severe: flooding, ponding, too clayey.	Severe: ponding, too clayey.	Severe: too clayey, ponding.	Severe: ponding, too clayey.	Severe: ponding, too clayey.
Sf: Sawabash	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
ShB: Shadeland	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, thin layer, area reclaim.
SmA: Sleeth	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Sn: Sloan	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
So: Sloan Variant	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
SrB: Sparta	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
SrC: Sparta	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Moderate: droughty, slope, too sandy.
StC: Spinks	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty.
SwA:					
Starks	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Fincastle	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
SyF:					
Strawn	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Rodman	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: droughty, slope.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
TbA: Tecumseh	Slight	Slight	Slight	Slight	Slight.
TcA: Thackery	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight	Slight.
TfB: Throckmorton	Slight	Slight	Moderate: slope.	Slight	Slight.
Tg: Tice	Severe: flooding.	Moderate: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.	Severe: flooding.
TmA:					
Toronto	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Millbrook	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
TnB2:					
Toronto	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Octagon	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.
TtA: Troxel	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Ua. Udorthents					
UbB: Urban land.					
Billett	Slight	Slight	Moderate: slope.	Slight	Slight.
UcA: Urban land.					
Carmi	Slight	Slight	Slight	Slight	Slight.
UmB: Urban land.					
Miami	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.
UmC: Urban land.					
Miami	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
UsA: Urban land.					

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
UsA:					
Starks	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Fincastle	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Wb: Wallkill	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
We: Washtenaw	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
WgA, WhA: Waupecan	Slight	Slight	Slight	Slight	Slight.
WmA: Waynetown	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
WtA: Wea	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
WuA: Whitaker	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.

TABLE 12.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
Am, Ap: Allison	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
AtB2:										
Alvin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Spinks	Fair	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
Ba, Bb: Battleground	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BgA: Beecher	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
BkF: Berks	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
BlA, BlB2: Billett	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BmA: Billett	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
BnA, BnB2: Billett	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BoA: Bowes	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
BpA: Bowes Variant	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CaA: Camden	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
CfB, CgA: Carmi	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Ck, Cl: Ceresco	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Cm: Chalmers	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Co, Cp: Cohoctah	Good	Good	Good	Good	Good	Good	Good	Fair	Good	Good.
CrC: Coloma	Poor	Fair	Fair	Fair	Good	Very poor.	Very poor.	Fair	Fair	Very poor.
CtA: Crosby	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.

TABLE 12.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
CwB2:										
Crosby	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Miami	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
DmC2, DoC2 Desker	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
DpD2:										
Desker	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Rodman	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Du:										
Drummer	Fair	Good	Good	Fair	Fair	Good	Good	Good	Fair	Good.
Drummer, stratified sandy substratum	Fair	Good	Good	Fair	Fair	Good	Good	Good	Fair	Good.
Dy Du Page	Good	Good	Good	Good	Good	Poor	Fair	Good	Good	Poor.
EkA, EmA Elston	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
FcB:										
Fincastle	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Crosby	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Hd Harpster	Fair	Fair	Good	Fair	Fair	Good	Fair	Fair	Fair	Fair.
HfB2 High Gap Variant	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
HfC2 High Gap Variant	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
HnB, HoA Hononegah	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Hv Houghton	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
KaA, KaB2, KbB2, KcB2 Kalamazoo	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
KcC2 Kalamazoo	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
KoD2 Kosciusko	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.

TABLE 12.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
KpC3---------------- Kosciusko	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
LaA----------------- Lafayette	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
LeA----------------- La Hogue	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Lm------------------ Lash	Poor	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
LnA, LnB2----------- Lauramie	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
LoA, LoB------------ Linkville	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
LvB2, LwB2---------- Longlois	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Mb------------------ Mahalasville	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Poor.
Mc------------------ Mahalasville	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Md:										
Mahalasville-------	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Treaty-------------	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
MmB2---------------- Marker	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MoA----------------- Mellott	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MsC2---------------- Miami	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MsD2---------------- Miami	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
MtC3---------------- Miami	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MtD3---------------- Miami	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Mu------------------ Milford	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
MwA----------------- Mulvey	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Mz------------------ Muskego	Good	Fair	Poor	Poor	Poor	Good	Good	Fair	Poor	Good.

TABLE 12.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Conif-erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
OaB2:										
Oakville----------	Poor	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
Billett-----------	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
OgA---------------- Ockley	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
OmB2--------------- Octagon	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
OmC2, OpC3--------- Octagon	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Ou, Ox, Oy--------- Ouiatenon	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Pc----------------- Palms	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Pd----------------- Palms	Poor	Fair	Poor	Fair	Fair	Good	Good	Fair	Fair	Good.
Pg----------------- Pella	Good	Good	Good	Fair	Fair	Good	Good	Good	Fair	Good.
Pk----------------- Peotone	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
PmB---------------- Pinevillage	Poor	Fair	Fair	Poor	Poor	Poor	Very poor.	Fair	Poor	Very poor.
Pt. Pits										
RaB2--------------- Rainsville	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
RcA:										
Raub--------------	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Brenton-----------	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
RdA, RdB2---------- Richardville	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
RdC2--------------- Richardville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
RoB---------------- Rockfield	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
RsF---------------- Rodman	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Rz----------------- Ross	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

TABLE 12.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
Sd----------------- Saranac	Very poor.	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good.
Sf----------------- Sawabash	Very poor.	Poor	Poor	Poor	Poor	Good	Fair	Fair	Poor	Fair.
ShB---------------- Shadeland	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
SmA---------------- Sleeth	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Sn----------------- Sloan	Fair	Fair	Fair	Poor	Poor	Good	Good	Fair	Poor	Good.
So----------------- Sloan Variant	Very poor.	Poor	Poor	Poor	Poor	Good	Fair	Fair	Poor	Fair.
SrB---------------- Sparta	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
SrC---------------- Sparta	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
StC---------------- Spinks	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
SwA:										
Starks------------	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Fincastle---------	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
SyF:										
Strawn------------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Rodman------------	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
TbA---------------- Tecumseh	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
TcA---------------- Thackery	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
TfB---------------- Throckmorton	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Tg----------------- Tice	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
TmA:										
Toronto-----------	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Millbrook---------	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
TnB2:										
Toronto-----------	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.

TABLE 12.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Conif-erous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
TnB2:										
Octagon	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
TtA Troxel	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Ua. Udorthents										
UbB:										
Urban land.										
Billett	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
UcA:										
Urban land.										
Carmi	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
UmB:										
Urban land.										
Miami	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
UmC:										
Urban land.										
Miami	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
UsA:										
Urban land.										
Starks	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Fincastle	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Wb Wallkill	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
We Washtenaw	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
WgA, WhA Waupecan	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WmA Waynetown	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
WtA Wea	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WuA Whitaker	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.

TABLE 13.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Am----------------- Allison	Slight---------	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, frost action.	Slight.
Ap----------------- Allison	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding, frost action.	Severe: flooding.
AtB2:						
Alvin-------------	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Moderate: droughty.
Spinks-----------	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Severe: droughty.
Ba----------------- Battleground	Slight---------	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, frost action.	Slight.
Bb----------------- Battleground	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding, frost action.	Severe: flooding.
BgA---------------- Beecher	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
BkF---------------- Berks	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
BlA---------------- Billett	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Moderate: frost action.	Slight.
BlB2-------------- Billett	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Slight.
BmA---------------- Billett	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Slight---------	Moderate: frost action.	Moderate: droughty.
BnA---------------- Billett	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Moderate: frost action.	Slight.
BnB2-------------- Billett	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Slight.
BoA---------------- Bowes	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
BpA---------------- Bowes Variant	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength, frost action.	Slight.

TABLE 13.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
CaA---------------- Camden	Slight---------	Moderate: shrink-swell.	Slight---------	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
CfB---------------- Carmi	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Slight.
CgA---------------- Carmi	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Moderate: frost action.	Slight.
Ck----------------- Ceresco	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: frost action.	Moderate: wetness.
Cl----------------- Ceresco	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Moderate: wetness, flooding.
Cm----------------- Chalmers	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
Co----------------- Cohoctah	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: ponding, frost action.	Severe: ponding.
Cp----------------- Cohoctah	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: ponding, flooding, frost action.	Severe: ponding.
CrC---------------- Coloma	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
CtA---------------- Crosby	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
CwB2:						
Crosby------------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
Miami-------------	Moderate: dense layer.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.	Slight.
DmC2--------------- Desker	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, droughty, slope.
DoC2--------------- Desker	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: droughty, slope.
DpD2:						
Desker------------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

TABLE 13.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
DpD2:						
Rodman	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
Du:						
Drummer	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
Drummer, stratified sandy substratum	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
Dy: Du Page	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
EkA, EmA: Elston	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Slight.
FcB:						
Fincastle	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
Crosby	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
Hd: Harpster	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
HfB2: High Gap Variant	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength.	Moderate: thin layer, area reclaim.
HfC2: High Gap Variant	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength.	Moderate: slope, thin layer, area reclaim.
HnB: Hononegah	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Severe: droughty.
HoA: Hononegah	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.
Hv: Houghton	Severe: excess humus, ponding.	Severe: subsides, ponding.	Severe: subsides, ponding.	Severe: subsides, ponding.	Severe: subsides, ponding, frost action.	Severe: ponding, excess humus.
KaA: Kalamazoo	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: small stones.

TABLE 13.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
KaB2: Kalamazoo	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: small stones.
KbB2, KcB2: Kalamazoo	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Slight.
KcC2: Kalamazoo	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: small stones, slope.
KoD2: Kosciusko	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
KpC3: Kosciusko	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, droughty, slope.
LaA: Lafayette	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
LeA: La Hogue	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
Lm: Lash	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
LnA: Lauramie	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
LnB2: Lauramie	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
LoA: Linkville	Slight	Slight	Slight	Slight	Moderate: frost action.	Slight.
LoB: Linkville	Slight	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
LvB2, LwB2: Longlois	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
Mb, Mc: Mahalasville	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
Md:						
Mahalasville	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
Treaty	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.

TABLE 13.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
MmB2-------------- Marker	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: frost action.	Moderate: wetness.
MoA--------------- Mellott	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
MsC2-------------- Miami	Moderate: slope, dense layer.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
MsD2-------------- Miami	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
MtC3-------------- Miami	Moderate: slope, dense layer.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
MtD3-------------- Miami	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
Mu---------------- Milford	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
MwA--------------- Mulvey	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
Mz---------------- Muskego	Severe: excess humus, ponding.	Severe: ponding, subsides.	Severe: ponding, subsides.	Severe: ponding, subsides.	Severe: subsides, ponding, frost action.	Severe: ponding, excess humus.
OaB2:						
Oakville---------	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Moderate: droughty.
Billett----------	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Moderate: slope.	Moderate: frost action.	Moderate: droughty.
OgA--------------- Ockley	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.	Slight.
OmB2-------------- Octagon	Moderate: dense layer.	Slight---------	Slight---------	Moderate: slope.	Severe: low strength.	Slight.
OmC2, OpC3-------- Octagon	Moderate: dense layer, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
Ou---------------- Ouiatenon	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
Ox---------------- Ouiatenon	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: droughty, flooding.

TABLE 13.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Oy------------------ Ouiatenon	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
Pc------------------ Palms	Severe: excess humus, ponding.	Severe: subsides, ponding.	Severe: subsides, ponding.	Severe: subsides, ponding.	Severe: subsides, ponding, frost action.	Severe: ponding, excess humus.
Pd------------------ Palms	Severe: cutbanks cave, excess humus, ponding.	Severe: subsides, ponding.	Severe: subsides, ponding.	Severe: subsides, ponding.	Severe: subsides, ponding.	Severe: ponding, excess humus.
Pg------------------ Pella	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
Pk------------------ Peotone	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding.
PmB----------------- Pinevillage	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action, large stones.	Moderate: small stones, large stones, droughty.
Pt. Pits						
RaB2---------------- Rainsville	Moderate: dense layer, wetness.	Slight---------	Moderate: wetness.	Moderate: slope.	Severe: low strength.	Slight.
RcA:						
Raub----------------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
Brenton-------------	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
RdA----------------- Richardville	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, frost action.	Slight.
RdB2---------------- Richardville	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, frost action.	Slight.
RdC2---------------- Richardville	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, slope, frost action.	Moderate: slope.
RoB----------------- Rockfield	Moderate: dense layer, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.

TABLE 13.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
RsF: Rodman	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
Rz: Ross	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: low strength, flooding, frost action.	Slight.
Sd: Saranac	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: low strength, ponding, flooding.	Severe: ponding, too clayey.
Sf: Sawabash	Severe: ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: low strength, ponding, flooding.	Severe: ponding, flooding.
ShB: Shadeland	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness, thin layer, area reclaim.
SmA: Sleeth	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
Sn: Sloan	Severe: ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: low strength, ponding, flooding.	Severe: ponding.
So: Sloan Variant	Severe: ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: ponding, flooding, frost action.	Severe: ponding.
SrB: Sparta	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty, too sandy.
SrC: Sparta	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope, too sandy.
StC: Spinks	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
SwA:						
Starks	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
Fincastle	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
SyF:						
Strawn	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

TABLE 13.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
SyF:						
Rodman	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
TbA Tecumseh	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
TcA Thackery	Severe: cutbanks cave, wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: frost action.	Slight.
TfB Throckmorton	Moderate: dense layer, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
Tg Tice	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength, flooding, frost action.	Severe: flooding.
TmA:						
Toronto	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
Millbrook	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
TnB2:						
Toronto	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
Octagon	Moderate: dense layer.	Slight	Slight	Moderate: slope.	Severe: low strength.	Slight.
TtA Troxel	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
Ua. Udorthents						
UbB: Urban land.						
Billett	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
UcA: Urban land.						
Carmi	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Slight.

TABLE 13.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
UmB:						
Urban land.						
Miami------------	Moderate: dense layer.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.	Slight.
UmC:						
Urban land.						
Miami------------	Moderate: slope, dense layer.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
UsA:						
Urban land.						
Starks-----------	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
Fincastle--------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
Wb---------------- Wallkill	Severe: excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, low strength.	Severe: ponding, frost action.	Severe: ponding.
We---------------- Washtenaw	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding.
WgA--------------- Waupecan	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
WhA--------------- Waupecan	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
WmA--------------- Waynetown	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
WtA--------------- Wea	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
WuA--------------- Whitaker	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.

TABLE 14.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Am------------------ Allison	Moderate: flooding, percs slowly.	Moderate: seepage.	Moderate: flooding, too clayey.	Moderate: flooding.	Poor: thin layer.
Ap------------------ Allison	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Poor: thin layer.
AtB2:					
Alvin--------------	Slight-----------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage.
Spinks-------------	Slight-----------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Ba------------------ Battleground	Moderate: flooding, percs slowly.	Moderate: seepage.	Moderate: flooding, too clayey.	Moderate: flooding.	Fair: too clayey.
Bb------------------ Battleground	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Fair: too clayey.
BgA----------------- Beecher	Severe: wetness, percs slowly.	Slight-----------	Severe: wetness.	Severe: wetness.	Poor: wetness.
BkF----------------- Berks	Severe: slope, depth to rock.	Severe: slope, seepage, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, area reclaim.
BlA, BlB2----------- Billett	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage.
BmA----------------- Billett	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
BnA, BnB2----------- Billett	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage.
BoA----------------- Bowes	Slight-----------	Severe: seepage.	Severe: seepage.	Slight-----------	Fair: too clayey, thin layer.
BpA----------------- Bowes Variant	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: too clayey, small stones, wetness.
CaA----------------- Camden	Slight-----------	Moderate: seepage.	Severe: seepage.	Slight-----------	Fair: too clayey.

TABLE 14.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CfB, CgA: Carmi	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Ck: Ceresco	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness, thin layer.
Cl: Ceresco	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness, thin layer.
Cm: Chalmers	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
Co: Cohoctah	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: ponding, thin layer.
Cp: Cohoctah	Severe: flooding, ponding, poor filter.	Severe: seepage, flooding, ponding.	Severe: flooding, seepage, ponding.	Severe: flooding, seepage, ponding.	Poor: ponding, thin layer.
CrC: Coloma	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
CtA: Crosby	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
CwB2:					
Crosby	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Miami	Severe: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
DmC2, DoC2: Desker	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
DpD2:					
Desker	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
Rodman	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
Du:					
Drummer	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.

TABLE 14.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Du:					
Drummer, stratified sandy substratum--	Severe: ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: ponding.	Poor: ponding.
Dy------------------ Du Page	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.
EkA, EmA------------ Elston	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage.
FcB:					
Fincastle----------	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Crosby-------------	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Hd------------------ Harpster	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
HfB2---------------- High Gap Variant	Severe: thin layer, seepage, wetness.	Severe: seepage, wetness.	Severe: seepage.	Moderate: seepage, wetness.	Poor: area reclaim, thin layer.
HfC2---------------- High Gap Variant	Severe: thin layer, seepage, wetness.	Severe: seepage, slope, wetness.	Severe: seepage.	Moderate: seepage, wetness, slope.	Poor: area reclaim, thin layer.
HnB, HoA------------ Hononegah	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Hv------------------ Houghton	Severe: subsides, ponding.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
KaA, KaB2, KbB2, KcB2--------------- Kalamazoo	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: thin layer.
KcC2---------------- Kalamazoo	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: thin layer.
KoD2---------------- Kosciusko	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
KpC3---------------- Kosciusko	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.

TABLE 14.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
LaA----------------- Lafayette	Severe: wetness.	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.
LeA----------------- La Hogue	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Lm------------------ Lash	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding, seepage.	Good.
LnA----------------- Lauramie	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
LnB2---------------- Lauramie	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
LoA----------------- Linkville	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
LoB----------------- Linkville	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
LvB2, LwB2---------- Longlois	Slight-----------	Moderate: seepage, slope.	Severe: seepage.	Slight-----------	Fair: too clayey.
Mb------------------ Mahalasville	Severe: ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: ponding.	Poor: ponding.
Mc------------------ Mahalasville	Severe: ponding.	Severe: seepage, ponding.	Severe: depth to rock, seepage, ponding.	Severe: ponding.	Poor: ponding, thin layer.
Md:					
Mahalasville-------	Severe: ponding, percs slowly.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: ponding.	Poor: hard to pack, ponding.
Treaty-------------	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
MmB2---------------- Marker	Severe: wetness, percs slowly.	Moderate: seepage, slope.	Severe: wetness.	Severe: wetness.	Fair: wetness.
MoA----------------- Mellott	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
MsC2---------------- Miami	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
MsD2---------------- Miami	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.

TABLE 14.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
MtC3----------------- Miami	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
MtD3----------------- Miami	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Mu------------------- Milford	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
MwA------------------ Mulvey	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.
Mz------------------- Muskego	Severe: ponding, subsides.	Severe: seepage, excess humus, ponding.	Severe: ponding, excess humus.	Severe: seepage, ponding.	Poor: hard to pack, ponding.
OaB2:					
Oakville------------	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Billett-------------	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
OgA------------------ Ockley	Slight-----------	Severe: seepage.	Severe: seepage.	Slight-----------	Poor: small stones.
OmB2----------------- Octagon	Severe: percs slowly.	Moderate: seepage, slope.	Slight-----------	Slight-----------	Good.
OmC2, OpC3----------- Octagon	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
Ou, Ox, Oy----------- Ouiatenon	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, too sandy.	Severe: flooding, seepage.	Poor: seepage, too sandy.
Pc------------------- Palms	Severe: subsides, ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
Pd------------------- Palms	Severe: subsides, ponding.	Severe: seepage, excess humus.	Severe: seepage, ponding.	Severe: seepage, ponding.	Poor: ponding, excess humus.
Pg------------------- Pella	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
Pk------------------- Peotone	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.

TABLE 14.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
PmB: Pinevillage	Moderate: flooding, large stones.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage, small stones.
Pt. Pits					
RaB2: Rainsville	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
RcA:					
Raub	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: hard to pack, wetness.
Brenton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
RdA: Richardville	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
RdB2: Richardville	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
RdC2: Richardville	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
RoB: Rockfield	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
RsF: Rodman	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
Rz: Ross	Moderate: flooding, wetness.	Severe: seepage.	Severe: seepage, wetness.	Severe: seepage.	Good.
Sd: Saranac	Severe: flooding, ponding, percs slowly.	Severe: seepage, flooding, ponding.	Severe: flooding, seepage, ponding.	Severe: flooding, ponding.	Poor: too clayey, ponding.
Sf: Sawabash	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Poor: ponding.
ShB: Shadeland	Severe: thin layer, seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: area reclaim, wetness, thin layer.
SmA: Sleeth	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.

TABLE 14.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Sn------------------- Sloan	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
So------------------- Sloan Variant	Severe: flooding, thin layer, seepage.	Severe: seepage, flooding, ponding.	Severe: flooding, seepage, ponding.	Severe: flooding, ponding.	Poor: area reclaim, ponding, thin layer.
SrB------------------ Sparta	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
SrC------------------ Sparta	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
StC------------------ Spinks	Moderate: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
SwA:					
Starks--------------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Fincastle-----------	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
SyF:					
Strawn--------------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Rodman--------------	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
TbA------------------ Tecumseh	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
TcA------------------ Thackery	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Fair: too clayey, small stones, wetness.
TfB------------------ Throckmorton	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
Tg------------------- Tice	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Good.
TmA:					
Toronto-------------	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Millbrook-----------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.

TABLE 14.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
TnB2:					
Toronto	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Octagon	Severe: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
TtA Troxel	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
Ua. Udorthents					
UbB: Urban land.					
Billett	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage.
UcA: Urban land.					
Carmi	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
UmB: Urban land.					
Miami	Severe: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
UmC: Urban land.					
Miami	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
UsA: Urban land.					
Starks	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Fincastle	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Wb Wallkill	Severe: ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
We Washtenaw	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.

TABLE 14.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
WgA----------------- Waupecan	Slight-----------	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too clayey, thin layer.
WhA----------------- Waupecan	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: too clayey, wetness, thin layer.
WmA----------------- Waynetown	Severe: wetness.	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.
WtA----------------- Wea	Severe: flooding.	Severe: flooding.	Severe: flooding, seepage.	Severe: flooding.	Fair: too clayey.
WuA----------------- Whitaker	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.

TABLE 15.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Am, Ap Allison	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
AtB2:				
Alvin	Good	Probable	Improbable: too sandy.	Poor: too sandy.
Spinks	Good	Probable	Improbable: too sandy.	Poor: too sandy.
Ba, Bb Battleground	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
BgA Beecher	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
BkF Berks	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
BlA, BlB2 Billett	Good	Probable	Probable	Fair: too clayey, small stones, area reclaim.
BmA Billett	Good	Probable	Improbable: too sandy.	Fair: small stones, area reclaim, thin layer.
BnA, BnB2 Billett	Good	Probable	Probable	Fair: too clayey, small stones, area reclaim.
BoA Bowes	Good	Probable	Probable	Poor: area reclaim.
BpA Bowes Variant	Fair: wetness.	Probable	Probable	Fair: small stones, area reclaim.
CaA Camden	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
CfB, CgA Carmi	Good	Probable	Probable	Poor: small stones, area reclaim.
Ck, Cl Ceresco	Fair: wetness.	Probable	Probable	Poor: area reclaim.
Cm Chalmers	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.

TABLE 15.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Co, Cp: Cohoctah	Poor: wetness.	Probable	Probable	Poor: area reclaim, wetness.
CrC: Coloma	Good	Probable	Improbable: too sandy.	Poor: too sandy, small stones.
CtA: Crosby	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
CwB2:				
Crosby	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Miami	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey.
DmC2, DoC2: Desker	Good	Probable	Probable	Poor: small stones.
DpD2:				
Desker	Fair: slope.	Probable	Probable	Poor: small stones, slope.
Rodman	Fair: slope.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Du:				
Drummer	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Drummer, stratified sandy substratum	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Dy: Du Page	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
EkA, EmA: Elston	Good	Probable	Probable	Fair: small stones, area reclaim.
FcB:				
Fincastle	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Crosby	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Hd: Harpster	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
HfB2, HfC2: High Gap Variant	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey, thin layer.

TABLE 15.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
HnB, HoA------------ Hononegah	Good	Probable	Probable	Poor: area reclaim, small stones.
Hv------------------ Houghton	Poor: wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
KaA, KaB2, KbB2, KcB2, KcC2----------------- Kalamazoo	Good	Probable	Probable	Poor: small stones, area reclaim.
KoD2---------------- Kosciusko	Fair: slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
KpC3---------------- Kosciusko	Good	Probable	Probable	Poor: small stones, area reclaim.
LaA----------------- Lafayette	Fair: wetness.	Probable	Probable	Fair: too clayey, area reclaim.
LeA----------------- La Hogue	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Lm------------------ Lash	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
LnA, LnB2----------- Lauramie	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
LoA, LoB------------ Linkville	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
LvB2, LwB2---------- Longlois	Good	Probable	Probable	Fair: small stones.
Mb------------------ Mahalasville	Poor: wetness.	Probable	Probable	Poor: wetness.
Mc------------------ Mahalasville	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Md:				
Mahalasville--------	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Treaty--------------	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
MmB2---------------- Marker	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.

TABLE 15.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
MoA: Mellott	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
MsC2: Miami	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, slope, too clayey.
MsD2: Miami	Fair: slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
MtC3: Miami	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, slope, too clayey.
MtD3: Miami	Fair: slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Mu: Milford	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
MwA: Mulvey	Fair: wetness.	Probable	Probable	Fair: area reclaim.
Mz: Muskego	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness.
OaB2:				
Oakville	Good	Probable	Improbable: too sandy.	Poor: too sandy.
Billett	Good	Probable	Improbable: too sandy.	Fair: small stones, area reclaim, thin layer.
OgA: Ockley	Good	Probable	Probable	Poor: small stones, area reclaim.
OmB2: Octagon	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey.
OmC2, OpC3: Octagon	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey, slope.
Ou, Ox: Ouiatenon	Good	Probable	Probable	Poor: too sandy, area reclaim.
Oy: Ouiatenon	Good	Probable	Improbable: too sandy.	Poor: too sandy.

TABLE 15.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Pc: Palms	Poor: wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
Pd: Palms	Poor: wetness.	Probable	Probable	Poor: excess humus, wetness.
Pg: Pella	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Pk: Peotone	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
PmB: Pinevillage	Fair: large stones.	Probable	Probable	Poor: small stones, area reclaim.
Pt. Pits				
RaB2: Rainsville	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
RcA:				
Raub	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Brenton	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
RdA, RdB2: Richardville	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
RdC2: Richardville	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
RoB: Rockfield	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
RsF: Rodman	Poor: slope.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Rz: Ross	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
Sd: Saranac	Poor: wetness.	Probable	Probable	Poor: too clayey, wetness.
Sf: Sawabash	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.

TABLE 15.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
ShB: Shadeland	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey, thin layer.
SmA: Sleeth	Fair: wetness.	Probable	Probable	Poor: area reclaim.
Sn: Sloan	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
So: Sloan Variant	Poor: area reclaim, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, small stones.
SrB, SrC: Sparta	Good	Probable	Improbable: too sandy.	Poor: too sandy.
StC: Spinks	Good	Probable	Improbable: too sandy.	Poor: too sandy.
SwA:				
Starks	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Fincastle	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
SyF:				
Strawn	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Rodman	Poor: slope.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
TbA: Tecumseh	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
TcA: Thackery	Fair: wetness.	Probable	Probable	Poor: area reclaim.
TfB: Throckmorton	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Tg: Tice	Fair: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
TmA:				
Toronto	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Millbrook	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.

TABLE 15.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
TnB2:				
Toronto	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Octagon	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey.
TtA Troxel	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
Ua. Udorthents				
UbB: Urban land.				
Billett	Good	Probable	Probable	Fair: too clayey, small stones, area reclaim.
UcA: Urban land.				
Carmi	Good	Probable	Probable	Poor: small stones, area reclaim.
UmB: Urban land.				
Miami	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey.
UmC: Urban land.				
Miami	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, slope, too clayey.
UsA: Urban land.				
Starks	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Fincastle	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Wb Wallkill	Poor: thin layer, wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
We Washtenaw	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.

TABLE 15.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
WgA, WhA: Waupecan	Good	Probable	Probable	Poor: area reclaim.
WmA: Waynetown	Fair: wetness.	Probable	Probable	Fair: small stones, area reclaim.
WtA: Wea	Good	Probable	Probable	Fair: too clayey, area reclaim.
WuA: Whitaker	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.

TABLE 16.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
Am, Ap: Allison	Moderate: seepage.	Severe: thin layer.	Severe: no water.	Deep to water	Favorable	Favorable.
AtB2:						
Alvin	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Soil blowing	Droughty, rooting depth.
Spinks	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty, erodes easily.
Ba, Bb: Battleground	Moderate: seepage.	Moderate: low strength.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
BgA: Beecher	Slight	Moderate: piping, wetness.	Severe: no water.	Percs slowly, frost action.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, rooting depth.
BkF: Berks	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Depth to rock, slope, large stones.	Droughty, depth to rock, slope.
BlA, BlB2: Billett	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Favorable.
BmA: Billett	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Too sandy, soil blowing.	Droughty.
BnA, BnB2: Billett	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy	Favorable.
BoA: Bowes	Moderate: seepage.	Moderate: thin layer.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
BpA: Bowes Variant	Severe: seepage.	Moderate: thin layer, piping, wetness.	Severe: cutbanks cave.	Frost action	Erodes easily, wetness.	Erodes easily.
CaA: Camden	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
CfB: Carmi	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Favorable.
CgA: Carmi	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy	Favorable.
Ck: Ceresco	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Frost action, cutbanks cave.	Wetness, soil blowing.	Wetness, droughty.

TABLE 16.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
Cl---------------- Ceresco	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Flooding, frost action, cutbanks cave.	Wetness---------	Wetness.
Cm---------------- Chalmers	Moderate: seepage.	Severe: ponding.	Severe: slow refill.	Ponding, frost action.	Ponding---------	Wetness.
Co---------------- Cohoctah	Severe: seepage.	Severe: piping, ponding.	Severe: cutbanks cave.	Ponding, frost action.	Ponding, soil blowing.	Wetness.
Cp---------------- Cohoctah	Severe: seepage.	Severe: piping, ponding.	Severe: cutbanks cave.	Ponding, flooding, frost action.	Ponding---------	Wetness.
CrC--------------- Coloma	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
CtA--------------- Crosby	Slight----------	Moderate: piping.	Severe: no water.	Percs slowly, frost action.	Erodes easily, wetness.	Wetness, erodes easily.
CwB2:						
Crosby-----------	Moderate: slope.	Moderate: piping.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, wetness.	Wetness, erodes easily.
Miami------------	Moderate: seepage, slope.	Moderate: piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
DmC2-------------- Desker	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty, rooting depth.
DoC2-------------- Desker	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty, rooting depth.
DpD2:						
Desker-----------	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty, rooting depth.
Rodman-----------	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
Du:						
Drummer----------	Moderate: seepage.	Severe: ponding.	Moderate: slow refill.	Ponding, frost action.	Ponding---------	Wetness.
Drummer, stratified sandy substratum------	Severe: seepage.	Severe: ponding.	Severe: cutbanks cave.	Ponding, frost action.	Ponding---------	Wetness.
Dy---------------- Du Page	Moderate: seepage.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Favorable-------	Favorable.

TABLE 16.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
EkA Elston	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Favorable.
EmA Elston	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy	Favorable.
FcB:						
Fincastle	Moderate: seepage.	Severe: wetness.	Severe: slow refill.	Frost action	Erodes easily, wetness.	Wetness, erodes easily.
Crosby	Slight	Moderate: piping.	Severe: no water.	Percs slowly, frost action.	Erodes easily, wetness.	Wetness, erodes easily.
Hd Harpster	Moderate: seepage.	Severe: ponding, piping.	Moderate: slow refill.	Ponding, frost action.	Ponding	Wetness.
HfB2 High Gap Variant	Moderate: seepage, slope.	Severe: thin layer.	Severe: no water.	Percs slowly, thin layer, slope.	Area reclaim, erodes easily.	Erodes easily, area reclaim.
HfC2 High Gap Variant	Severe: slope.	Severe: thin layer.	Severe: no water.	Percs slowly, thin layer, slope.	Slope, area reclaim, erodes easily.	Slope, erodes easily, area reclaim.
HnB, HoA Hononegah	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty, rooting depth.
Hv Houghton	Severe: seepage.	Severe: excess humus, ponding.	Severe: slow refill.	Ponding, subsides, frost action.	Ponding, soil blowing.	Wetness.
KaA, KaB2 Kalamazoo	Severe: seepage.	Severe: thin layer.	Severe: no water.	Deep to water	Favorable	Favorable.
KbB2, KcB2 Kalamazoo	Severe: seepage.	Severe: thin layer.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
KcC2 Kalamazoo	Severe: seepage, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope	Slope.
KoD2, KpC3 Kosciusko	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
LaA Lafayette	Moderate: seepage.	Severe: wetness.	Severe: cutbanks cave.	Frost action	Erodes easily, wetness.	Wetness, erodes easily.
LeA La Hogue	Moderate: seepage.	Severe: wetness.	Severe: slow refill, cutbanks cave.	Frost action	Wetness	Wetness.
Lm Lash	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Favorable	Favorable.
LnA Lauramie	Moderate: seepage.	Moderate: thin layer.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.

TABLE 16.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
LnB2---------------- Lauramie	Moderate: seepage, slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
LoA---------------- Linkville	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Favorable------	Favorable.
LoB---------------- Linkville	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Favorable------	Favorable.
LvB2, LwB2--------- Longlois	Moderate: seepage, slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Favorable------	Favorable.
Mb----------------- Mahalasville	Severe: seepage.	Severe: ponding.	Severe: cutbanks cave.	Ponding, frost action.	Ponding---------	Wetness.
Mc----------------- Mahalasville	Severe: seepage.	Severe: ponding.	Severe: no water.	Ponding, frost action.	Erodes easily, ponding.	Wetness, erodes easily.
Md:						
Mahalasville------	Severe: seepage.	Severe: thin layer, ponding.	Severe: slow refill, cutbanks cave.	Ponding, percs slowly, frost action.	Ponding, percs slowly.	Wetness, percs slowly.
Treaty------------	Moderate: seepage.	Severe: ponding.	Severe: slow refill.	Ponding, frost action.	Ponding, erodes easily.	Wetness, erodes easily.
MmB2--------------- Marker	Moderate: seepage, slope.	Severe: wetness.	Severe: slow refill.	Percs slowly, frost action, slope.	Erodes easily, wetness, percs slowly.	Erodes easily, rooting depth, percs slowly.
MoA---------------- Mellott	Moderate: seepage.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
MsC2, MsD2, MtC3, MtD3-------------- Miami	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
Mu----------------- Milford	Slight---------	Severe: ponding.	Severe: slow refill.	Ponding, frost action.	Erodes easily, ponding.	Wetness, erodes easily.
MwA---------------- Mulvey	Moderate: seepage.	Severe: wetness.	Severe: cutbanks cave.	Frost action---	Erodes easily, wetness.	Wetness, erodes easily.
Mz----------------- Muskego	Severe: seepage.	Severe: excess humus, ponding.	Severe: slow refill.	Ponding, percs slowly.	Ponding, soil blowing, percs slowly.	Wetness, percs slowly.
OaB2:						
Oakville----------	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty.
Billett-----------	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Too sandy, soil blowing.	Droughty.

TABLE 16.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
OgA: Ockley	Severe: seepage.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
OmB2: Octagon	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily, percs slowly.	Erodes easily, rooting depth.
OmC2, OpC3: Octagon	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, rooting depth.
Ou, Ox, Oy: Ouiatenon	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty.
Pc: Palms	Severe: seepage.	Severe: excess humus, ponding.	Severe: slow refill.	Ponding, subsides, frost action.	Ponding, soil blowing.	Wetness, rooting depth.
Pd: Palms	Severe: seepage.	Severe: excess humus, ponding.	Severe: slow refill, cutbanks cave.	Ponding, subsides.	Ponding, soil blowing.	Wetness.
Pg: Pella	Moderate: seepage.	Severe: piping, ponding.	Moderate: slow refill.	Ponding, frost action.	Ponding	Wetness.
Pk: Peotone	Slight	Severe: ponding.	Severe: slow refill.	Ponding, percs slowly, frost action.	Ponding, percs slowly.	Wetness, percs slowly.
PmB: Pinevillage	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, soil blowing.	Large stones, droughty.
Pt. Pits						
RaB2: Rainsville	Moderate: seepage, slope.	Moderate: thin layer, piping, wetness.	Severe: slow refill.	Slope	Erodes easily, wetness.	Erodes easily.
RcA:						
Raub	Slight	Severe: wetness.	Severe: slow refill.	Frost action	Erodes easily, wetness.	Wetness, erodes easily.
Brenton	Moderate: seepage.	Severe: wetness.	Severe: cutbanks cave.	Frost action	Wetness	Wetness.
RdA: Richardville	Moderate: seepage.	Moderate: thin layer.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
RdB2: Richardville	Moderate: seepage, slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
RdC2: Richardville	Severe: slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.

TABLE 16.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
RoB--------------- Rockfield	Moderate: seepage, slope.	Moderate: thin layer, piping, wetness.	Severe: slow refill.	Frost action, slope.	Erodes easily, wetness.	Erodes easily.
RsF--------------- Rodman	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
Rz---------------- Ross	Severe: seepage.	Severe: piping.	Moderate: deep to water, slow refill.	Deep to water	Favorable------	Favorable.
Sd---------------- Saranac	Severe: seepage.	Severe: ponding.	Severe: slow refill, cutbanks cave.	Ponding, flooding, frost action.	Erodes easily, ponding.	Wetness, erodes easily.
Sf---------------- Sawabash	Moderate: seepage.	Severe: ponding.	Moderate: slow refill.	Ponding, flooding, frost action.	Ponding--------	Wetness.
ShB--------------- Shadeland	Moderate: seepage.	Severe: thin layer.	Severe: no water.	Thin layer, frost action.	Area reclaim, erodes easily, wetness.	Wetness, erodes easily, area reclaim.
SmA--------------- Sleeth	Severe: seepage.	Severe: wetness.	Severe: cutbanks cave.	Frost action---	Wetness--------	Wetness.
Sn---------------- Sloan	Moderate: seepage.	Severe: piping, wetness.	Severe: slow refill.	Flooding, frost action.	Erodes easily, wetness.	Wetness, erodes easily.
So---------------- Sloan Variant	Moderate: seepage.	Severe: ponding.	Severe: no water.	Ponding, thin layer, flooding.	Area reclaim, ponding.	Wetness, area reclaim.
SrB--------------- Sparta	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty.
SrC--------------- Sparta	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
StC--------------- Spinks	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
SwA: Starks-----------	Moderate: seepage.	Severe: thin layer, wetness.	Severe: cutbanks cave.	Frost action---	Erodes easily, wetness.	Wetness, erodes easily.
Fincastle--------	Moderate: seepage.	Severe: wetness.	Severe: slow refill.	Frost action---	Erodes easily, wetness.	Wetness, erodes easily.
SyF: Strawn-----------	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.

TABLE 16.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
SyF:						
Rodman	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
TbA Tecumseh	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
TcA Thackery	Severe: seepage.	Moderate: thin layer, piping, wetness.	Severe: cutbanks cave.	Frost action	Erodes easily, wetness.	Erodes easily.
TfB Throckmorton	Moderate: seepage.	Severe: thin layer.	Severe: slow refill.	Frost action	Erodes easily, wetness.	Erodes easily.
Tg Tice	Moderate: seepage.	Severe: wetness.	Moderate: slow refill.	Flooding, frost action.	Wetness	Favorable.
TmA:						
Toronto	Moderate: seepage.	Severe: wetness.	Severe: slow refill.	Frost action	Wetness	Wetness.
Millbrook	Moderate: seepage.	Severe: wetness.	Severe: cutbanks cave.	Frost action	Erodes easily, wetness.	Wetness, erodes easily.
TnB2:						
Toronto	Moderate: seepage, slope.	Severe: wetness.	Severe: slow refill.	Frost action, slope.	Wetness	Wetness.
Octagon	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily, percs slowly.	Erodes easily, rooting depth.
TtA Troxel	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Favorable	Favorable.
Ua. Udorthents						
UbB: Urban land.						
Billett	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy	Favorable.
UcA: Urban land.						
Carmi	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy	Favorable.
UmB: Urban land.						
Miami	Moderate: seepage, slope.	Moderate: piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.

TABLE 16.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
UmC: Urban land.						
Miami	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
UsA: Urban land.						
Starks	Moderate: seepage.	Severe: thin layer, wetness.	Severe: cutbanks cave.	Frost action	Erodes easily, wetness.	Wetness, erodes easily.
Fincastle	Moderate: seepage.	Severe: wetness.	Severe: slow refill.	Frost action	Erodes easily, wetness.	Wetness, erodes easily.
Wb: Wallkill	Severe: seepage.	Severe: excess humus, ponding.	Severe: slow refill.	Ponding, percs slowly, subsides.	Erodes easily, ponding.	Wetness, erodes easily, percs slowly.
We: Washtenaw	Moderate: seepage.	Severe: piping, ponding.	Severe: slow refill.	Ponding, percs slowly, frost action.	Erodes easily, ponding.	Wetness, erodes easily, percs slowly.
WgA: Waupecan	Severe: seepage.	Moderate: thin layer.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
WhA: Waupecan	Severe: seepage.	Moderate: thin layer, wetness.	Severe: cutbanks cave.	Deep to water	Erodes easily	Erodes easily, rooting depth.
WmA: Waynetown	Moderate: seepage.	Severe: wetness.	Severe: cutbanks cave.	Frost action	Erodes easily, wetness.	Wetness, erodes easily.
WtA: Wea	Moderate: seepage.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Favorable	Favorable.
WuA: Whitaker	Moderate: seepage.	Severe: wetness.	Severe: cutbanks cave, slow refill.	Frost action	Erodes easily, wetness.	Wetness, erodes easily.

TABLE 17.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Fragments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Am, Ap----------- Allison	0-18	Silt loam--------	CL, ML, CL-ML	A-6, A-4	0	100	100	95-100	75-100	25-40	5-15
	18-51	Silty clay loam, silt loam.	CL, ML, CL-ML	A-6, A-7, A-4	0	100	100	95-100	75-100	25-50	5-25
	51-80	Silty clay loam, silt loam.	ML, CL, CH, MH	A-6, A-7, A-4	0	100	100	95-100	75-100	25-50	5-25
AtB2: Alvin-----------	0-10	Fine sandy loam	SM, ML	A-4, A-2-4	0	100	100	80-100	25-50	<25	NP-10
	10-27	Fine sandy loam, sandy loam.	SM, ML	A-2-4, A-4	0	100	100	70-100	15-50	<25	NP-10
	27-38	Fine sandy loam, sandy loam.	SM, SC, CL, ML	A-2-4, A-4, A-6	0	100	100	70-100	15-50	<25	NP-10
	38-60	Sandy loam, loamy sand.	SP, SP-SM, SM	A-2-4	0	100	100	70-90	15-35	<20	NP-10
Spinks----------	0-8	Fine sand--------	SP-SM, SM	A-2-4, A-3, A-1-b	0	100	100	70-95	0-30	<20	NP-4
	8-28	Loamy sand, sand, loamy fine sand.	SM, SP-SM, SC-SM	A-2-4, A-3, A-1-b	0	100	100	70-95	0-30	<25	NP-7
	28-61	Fine sand, loamy fine sand, sand.	SM, SP-SM, SC-SM	A-2-4, A-3	0	100	100	70-95	0-30	<25	NP-7
	61-70	Fine sand, sand	SP-SM, SM	A-2-4, A-3, A-1-b	0	100	100	70-90	0-15	<20	NP-4
Ba, Bb----------- Battleground	0-10	Silt loam--------	CL	A-6, A-4	0	100	100	95-100	75-100	25-40	5-15
	10-19	Silt loam, silty clay loam.	CL	A-6, A-7, A-4	0	100	100	95-100	75-100	25-50	5-25
	19-60	Silty clay loam, silt loam.	CL	A-6, A-7, A-4	0	100	100	95-100	75-100	25-50	5-25
BgA-------------- Beecher	0-9	Silt loam--------	ML	A-6, A-4	0	100	100	95-100	85-100	25-40	4-15
	9-41	Silty clay loam	CL, CH	A-6, A-7-6	0	100	100	95-100	95-100	35-55	15-35
	41-60	Silty clay loam	CL	A-6, A-7-6	0-5	98-100	95-100	85-95	70-85	25-45	10-25
BkF-------------- Berks	0-8	Channery silt loam.	ML, SM-SC, SC	A-6, A-4, A-7	0-30	55-80	50-75	45-70	40-65	25-40	5-15
	8-17	Very channery silt loam.	GM, SM, GC, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-40	5-15
	17-29	Channery silt loam.	SC, SM-SC, ML	A-6, A-4, A-7	0-30	55-80	50-75	45-70	40-65	25-40	5-15
	29	Weathered bedrock	---	---	---	---	---	---	---	---	---
BlA, BlB2-------- Billett	0-9	Fine sandy loam	SM, SC-SM, SC	A-4	0	95-100	90-100	80-90	20-45	<25	NP-10
	9-30	Fine sandy loam	SC, SC-SM, SM	A-2-4, A-4	0	85-100	75-100	60-90	25-50	10-30	NP-10
	30-39	Sandy loam, fine sandy loam.	SC, SC-SM, SM	A-2-4, A-4	0	85-100	75-100	55-90	25-50	10-30	NP-10
	39-60	Loamy sand-------	SM, SP-SM, SC-SM	A-1, A-2-4	0-5	85-100	75-100	55-85	10-25	---	NP
	60-65	Gravelly coarse sand.	SP, SP-SM, SW-SM	A-1-b	0-10	65-85	50-75	15-40	0-10	---	NP

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
BmA-------------- Billett	0-9	Fine sandy loam	SM, SC, SC-SM	A-4, A-2-4	0	100	100	80-100	25-50	<25	NP-10
	9-22	Fine sandy loam, sandy loam.	SM, SC, SC-SM	A-4, A-2-4	0	100	100	70-100	15-50	<25	NP-10
	22-80	Sandy loam, loamy sand.	SM, SC, SP-SM	A-2-4, A-4	0	100	100	70-90	15-35	<25	NP-10
BnA, BnB2-------- Billett	0-9	Loam-------------	ML, CL-ML	A-4, A-6	0	95-100	90-100	75-85	50-65	20-40	5-20
	9-27	Loam-------------	SC, SC-SM, CL, CL-ML	A-4, A-6	0	85-100	75-100	60-90	40-60	20-40	5-20
	27-38	Sandy loam-------	SC, SC-SM, SM	A-2-4, A-4	0	90-100	75-100	55-85	25-40	10-30	NP-10
	38-56	Loamy sand-------	SM, SP-SM, SC-SM	A-1, A-2-4	0-5	85-100	75-100	55-85	10-25	---	NP
	56-60	Gravelly coarse sand.	SP, SP-SM, SW-SM	A-1-b	0-10	65-85	50-75	15-40	0-10	---	NP
BoA-------------- Bowes	0-9	Silt loam--------	CL-ML, CL, ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	9-28	Silty clay loam, silt loam.	CL, ML	A-6, A-4, A-7-6	0	100	100	90-100	75-100	25-50	5-35
	28-56	Clay loam, gravelly sandy clay loam, fine sand.	CL, SC, SM-SC	A-2, A-4, A-6, A-7	0-5	60-100	50-90	30-85	0-65	0-60	NP-30
	56-60	Gravelly coarse sand.	SP, SW, SP-SM, SW-SM	A-1-b	0-10	65-85	50-75	15-40	0-10	---	NP
BpA-------------- Bowes Variant	0-9	Silt loam--------	CL-ML, CL, ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	9-26	Silt loam, silty clay loam.	CL, ML	A-6, A-4, A-7-6	0	100	100	90-100	75-100	25-50	5-35
	26-53	Gravelly sandy loam, loam, clay loam.	CL, SC, SP-SM, SW	A-2, A-4, A-6, A-1	0-5	60-100	50-100	35-90	25-60	<60	NP-30
	53-60	Gravelly sand----	SW, SP, SP-SM, SW-SM	A-1-b, A-3	0-10	65-85	50-75	15-40	0-10	---	NP
CaA-------------- Camden	0-9	Silt loam--------	CL, ML, CL-ML	A-4, A-6	0	100	100	95-100	85-100	25-40	4-15
	9-29	Silt loam, silty clay loam.	CL, ML	A-6, A-4, A-7-6	0	100	100	95-100	85-100	25-50	5-35
	29-64	Loam, sandy loam, fine sandy loam.	ML, SC, SM, CL	A-2, A-4, A-6	0	85-100	75-100	55-90	25-60	10-40	NP-20
	64-70	Stratified sandy loam to silt loam.	SM, SC, ML, CL	A-2-4, A-4, A-6	0	90-100	75-100	55-100	25-100	25-40	NP-10
CfB-------------- Carmi	0-13	Sandy loam-------	SC-SM, SC, SM	A-2-4, A-4	0	80-100	75-100	60-80	25-40	<25	NP-10
	13-45	Very gravelly loamy sand, sandy loam, very gravelly sandy loam.	SC-SM, SC, SM, SP-SM	A-2-4, A-4, A-6	0-5	40-100	35-100	20-85	5-40	<30	NP-10
	45-60	Sand, very gravelly coarse sand.	SP-SM, SW-SM, SP, SW	A-1-b, A-1-a	0-10	45-85	25-75	10-40	0-10	---	NP

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
CgA-------------- Carmi	0-20	Loam-------------	CL-ML, ML	A-4, A-6	0	90-100	90-100	75-85	50-65	20-40	5-20
	20-54	Gravelly sandy loam, loam, gravelly loamy sand.	SC-SM, SM, CL-ML	A-2-4, A-4, A-6	0-5	60-85	50-80	35-70	10-60	10-40	NP-20
	54-60	Sand, very gravelly coarse sand.	SP-SM, SW-SM, SP, SW	A-1-b, A-1-a	0-10	45-85	25-75	10-40	0-10	---	NP
Ck--------------- Ceresco	0-16	Sandy loam-------	SM, SC-SM, SC	A-2-4, A-4	0	100	100	90-100	25-45	<25	NP-10
	16-40	Sandy loam, fine sandy loam, loamy fine sand.	SC-SM, SM, SC	A-2-4, A-4	0	85-100	75-100	60-100	15-45	<30	NP-10
	40-60	Gravelly sand, very gravelly sand.	SP, SP-SM	A-1-b, A-1-a	0-10	45-85	25-75	10-40	0-10	---	NP
Cl--------------- Ceresco	0-13	Loam-------------	CL-ML, CL	A-4, A-6	0	100	100	90-100	55-85	20-40	5-25
	13-31	Sandy loam, fine sandy loam, loam.	SC-SM, CL-ML, SC, CL	A-2-4, A-4	0	85-100	75-100	60-100	25-80	10-40	NP-25
	31-60	Gravelly sand, very gravelly sand.	SP, SP-SM, SW, SW-SM	A-1-b, A-1-a	0-10	45-85	25-75	10-40	0-10	---	NP
Cm--------------- Chalmers	0-13	Silty clay loam	CL, ML, CH	A-6, A-7-6	0	100	100	95-100	85-100	35-55	10-30
	13-30	Silty clay loam, silt loam.	CL, ML, CH, CL-ML	A-6, A-4, A-7-6	0	100	100	90-100	80-100	25-65	4-40
	30-45	Loam, clay loam	CL, CL-ML	A-4, A-6, A-7-6	0-1	95-100	90-100	85-95	55-80	20-50	5-30
	45-60	Loam-------------	CL-ML, CL, ML	A-4, A-6	0-3	90-100	85-98	75-90	45-70	15-30	NP-15
Co--------------- Cohoctah	0-13	Fine sandy loam	SM, SC, SC-SM	A-4, A-2-4	0	100	100	85-100	30-45	<25	NP-10
	13-32	Loam, sandy loam, fine sandy loam.	SM, SM-SC, SC	A-4, A-2-4	0	85-100	75-100	60-100	25-45	10-40	NP-25
	32-60	Sand, gravelly coarse sand, loamy sand.	SP-SM, SM, SW, SW-SM	A-1-b, A-3, A-2-4	0-10	65-100	50-100	65-95	0-30	---	NP
Cp--------------- Cohoctah	0-20	Loam-------------	CL, CL-ML	A-4, A-6	0	100	100	90-100	55-80	20-40	5-25
	20-45	Loam, sandy loam, fine sandy loam.	SM-SC, SC	A-4, A-2-4	0	85-100	75-100	60-100	25-45	10-40	NP-25
	45-60	Sand, gravelly coarse sand, loamy sand.	SP-SM, SP, SW-SM	A-1-b, A-3, A-2-4	0-10	65-100	50-100	65-95	0-30	---	NP
CrC-------------- Coloma	0-8	Sand-------------	SM, SP-SM	A-2-4, A-3	0	100	100	70-90	5-15	---	NP
	8-34	Sand-------------	SM, SP-SM	A-2-4, A-3	0	100	100	70-90	5-15	---	NP
	34-60	Stratified sand to sandy loam.	SM, SP-SM	A-2-4, A-3	0-8	100	100	70-90	5-15	---	NP
CtA-------------- Crosby	0-9	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	9-29	Clay loam, silty clay loam, loam.	CL, ML, CH, CL-ML	A-6, A-4, A-7-6	0-1	95-100	90-100	85-100	55-90	20-55	5-35
	29-60	Loam-------------	CL, ML, CL-ML	A-4, A-6	0-3	90-100	85-98	75-90	45-70	15-30	NP-15

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
CwB2:											
Crosby----------	0-9	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	9-31	Clay loam, silty clay loam, loam.	CL, ML, CH, CL-ML	A-6, A-4, A-7-6	0-1	95-100	90-100	85-100	55-90	20-55	5-35
	31-60	Loam-------------	CL, ML, CL-ML	A-4, A-6	0-3	90-100	85-98	75-90	45-70	15-30	NP-15
Miami-----------	0-9	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	9-36	Clay loam, sandy clay loam, loam.	CL, CL-ML	A-6, A-4, A-7-6	0-1	90-100	90-100	75-100	45-90	20-50	5-30
	36-60	Loam, fine sandy loam.	CL, CL-ML, SC, SM	A-4, A-6	0-3	90-100	85-98	65-90	40-70	15-35	NP-20
DmC2------------- Desker	0-8	Gravelly sandy loam.	SC-SM, SC, SM	A-2-4	0-5	55-80	50-75	35-65	10-30	<25	NP-10
	8-14	Gravelly sandy loam, gravelly coarse sandy loam.	SC-SM, SC, SM	A-2-4	0-5	55-90	50-75	25-55	15-25	10-30	NP-10
	14-27	Gravelly loamy coarse sand.	SW-SM, SM, SP-SM	A-1-b	0-5	65-85	50-75	25-50	0-15	---	NP
	27-60	Gravelly sand, sand, very gravelly coarse sand.	SP, SW, SP-SM, SW-SM	A-1-b	0-10	45-85	25-75	10-40	0-10	---	NP
DoC2------------- Desker	0-9	Sandy loam-------	SM, SC-SM, SC	A-2-4	0-5	80-100	75-100	60-80	25-40	<25	NP-10
	9-15	Gravelly sandy loam, gravelly coarse sandy loam.	SC-SM, SC, SM	A-2-4	0-5	55-90	50-75	25-55	15-25	10-30	NP-10
	15-34	Gravelly loamy coarse sand.	SW-SM, SM, SP-SM	A-1-b	0-5	65-85	50-75	25-50	0-15	---	NP
	34-60	Gravelly sand, sand, very gravelly coarse sand.	SP, SW, SP-SM, SW-SM	A-1-b	0-10	45-85	25-75	10-40	0-10	---	NP
DpD2:											
Desker----------	0-9	Sandy loam-------	SM, SC-SM, SC	A-2-4	0-5	80-100	75-100	60-80	25-40	<25	NP-10
	9-14	Gravelly sandy loam, gravelly coarse sandy loam.	SC-SM, SC	A-2-4	0-5	55-90	50-75	25-50	15-25	10-30	NP-10
	14-30	Gravelly loamy coarse sand.	SW-SM, SM, SP-SM	A-1-b	0-5	65-85	50-75	25-50	0-15	---	NP
	30-60	Gravelly sand, sand, very gravelly coarse sand.	SP, SW, SP-SM, SW-SM	A-1	0-10	45-85	25-75	10-40	0-10	---	NP

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
DpD2:											
Rodman----------	0-8	Gravelly sandy loam.	SC-SM, SM, SC	A-2-4	0-5	55-80	50-75	35-65	10-30	<25	NP-10
	8-12	Gravelly loam, gravelly sandy loam, gravelly loamy coarse sand.	ML, CL, SC, SM	A-4, A-2-4, A-1-b	0-5	65-90	50-75	25-55	0-25	<40	NP-20
	12-60	Stratified sand to extremely gravelly coarse sand.	SP, SW-SM, SW, GW-GM	A-1	1-10	45-65	25-50	10-20	0-10	---	NP
Du:											
Drummer---------	0-17	Silty clay loam	CL, ML, CH	A-6, A-7-6	0	100	100	95-100	85-100	35-55	10-30
	17-54	Silty clay loam, silt loam.	CL, ML, CH, CL-ML	A-6, A-4, A-7-6	0	100	100	95-100	85-100	25-65	4-40
	54-70	Loam, sandy loam, clay loam.	CL, CL-ML, SC, SM-SC	A-6, A-7, A-4, A-2	0	95-100	90-100	85-95	25-80	10-60	NP-30
	70-80	Stratified sandy loam to silty clay loam.	SC, CL, SM-SC, SM	A-4, A-6, A-7, A-2	0	90-100	75-100	55-100	25-90	10-50	NP-25
Drummer, stratified sandy substratum-----	0-11	Silty clay loam	CL, ML, CH	A-6, A-7-6	0	100	100	95-100	85-100	35-55	10-30
	11-44	Silty clay loam	CL, CH	A-7-6	0	100	100	95-100	85-100	40-65	20-40
	44-58	Loam, silt loam, fine sandy loam.	CL-ML, CL, SC, SM-SC	A-4, A-6, A-2	0	95-100	90-100	85-100	25-90	10-40	NP-20
	58-70	Stratified silt loam to sand.	SP-SM, SM, CL, CL-ML	A-2-4, A-3, A-4, A-6	0	90-100	85-100	55-100	0-75	<40	NP-15
Dy--------------- Du Page	0-49	Loam-------------	CL, CL-ML	A-6, A-4	0	100	100	90-100	55-80	20-40	5-25
	49-60	Sandy loam-------	SC, SC-SM, SM	A-4, A-2-4	0	100	100	90-100	25-45	10-30	NP-10
EkA-------------- Elston	0-10	Sandy loam-------	SM, SC-SM, SC	A-2-4, A-4	0	100	100	80-90	25-40	<25	NP-10
	10-25	Sandy loam-------	SM, SC-SM, SC	A-2-4, A-4	0	100	100	80-90	25-40	10-30	NP-10
	25-49	Loamy sand, loamy coarse sand, sand.	SP-SM, SM	A-2-4, A-3	0	85-100	75-100	40-85	0-25	---	NP
	49-60	Gravelly sand, gravelly coarse sand, coarse sand.	SP, SW, SP-SM, SW-SM	A-1-b	0-10	65-85	50-75	15-40	0-10	---	NP

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
EmA--------------- Elston	0-14	Loam-------------	ML, CL-ML	A-4, A-6	0	100	100	85-100	55-70	20-40	5-20
	14-19	Loam-------------	CL-ML, CL	A-4, A-6	0	100	100	90-100	50-80	20-40	5-20
	19-38	Sandy loam-------	SM, SC-SM, SC	A-2-4, A-4	0	90-100	75-100	55-85	25-40	10-30	NP-10
	38-58	Loamy sand, loamy coarse sand, sand.	SP-SM, SM	A-2-4, A-3	0	85-100	75-100	40-85	0-25	---	NP
	58-70	Gravelly sand, gravelly coarse sand, coarse sand.	SP, SW, SP-SM, SW-SM	A-1-b	0-10	65-85	50-75	15-40	0-10	---	NP
FcB: Fincastle--------	0-8	Silt loam--------	CL, ML, CL-ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	8-32	Silty clay loam, silt loam.	CL, ML, CH	A-6, A-4, A-7-6	0	100	100	90-100	75-100	25-55	5-35
	32-42	Clay loam, loam	CL, CL-ML	A-6, A-4, A-7-6	0-1	95-100	90-100	85-95	55-80	20-50	5-30
	42-60	Loam-------------	CL, ML, CL-ML	A-4, A-6	0-3	90-100	85-98	65-90	45-70	15-30	NP-15
Crosby-----------	0-9	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	9-38	Clay loam, silty clay loam, loam.	CL, ML, CL-ML, CH	A-6, A-4, A-7-6	0-1	95-100	90-100	85-100	55-90	20-55	5-35
	38-60	Loam-------------	CL, ML, CL-ML	A-4, A-6	0-3	90-100	85-98	75-90	45-70	15-30	NP-15
Hd---------------- Harpster	0-11	Silt loam--------	CL, ML	A-6, A-4	0	100	100	95-100	80-95	30-40	5-20
	11-30	Silty clay loam, silt loam.	CL, CH, ML	A-7-6, A-4, A-6	0	100	100	95-100	70-100	25-55	5-35
	30-60	Silty clay loam, silt loam.	CL, CH, ML, CL-ML	A-6, A-4, A-7-6	0	100	100	95-100	70-100	25-50	NP-25
HfB2, HfC2-------- High Gap Variant	0-9	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	9-28	Clay loam, silt loam, silty clay loam.	CL, ML, CL-ML	A-7-6, A-6, A-4	0	80-100	75-100	70-100	50-100	20-50	5-35
	28-36	Channery clay loam.	CL, SC, SC-SM, SM	A-7-6, A-4, A-6	0-5	60-85	50-75	45-70	35-55	20-60	5-30
	36	Weathered bedrock	---	---	---	---	---	---	---	---	---
HnB--------------- Hononegah	0-10	Loamy sand-------	SM, SP-SM	A-2-4	0-3	95-100	95-100	60-85	10-25	---	NP
	10-34	Gravelly loamy sand, loamy sand, fine sandy loam.	SM, SP-SM, SC-SM, SC	A-2-4, A-1, A-4	0-15	70-100	55-98	40-90	10-50	<30	NP-10
	34-60	Coarse sand, very gravelly coarse sand.	SP, SW, SP-SM, SW-SM	A-1-a, A-1-b	0-15	45-85	25-75	10-40	0-10	---	NP

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
HoA---------------- Hononegah	0-11	Fine sandy loam	SM, SC-SM, SC	A-2-4, A-4	0-3	95-100	90-100	80-90	20-45	<25	NP-10
	11-45	Gravelly loamy sand, loamy sand, fine sandy loam.	SM, SP-SM, SC-SM, SC	A-2-4, A-1, A-4	0-15	70-100	55-98	40-90	10-50	<30	NP-10
	45-60	Coarse sand, very gravelly coarse sand.	SP, SW, SW-SM, SP-SM	A-1-a, A-1-b	0-15	45-85	25-75	10-40	0-10	---	NP
Hv---------------- Houghton	0-60	Sapric material	PT	A-8	0	---	---	---	---	---	---
KaA, KaB2--------- Kalamazoo	0-11	Loam-------------	ML, CL-ML	A-4, A-6	0	100	100	85-100	55-70	20-40	5-20
	11-34	Loam, sandy clay loam, gravelly sandy loam.	SC, CL, CL-ML, SM-SC	A-4, A-6, A-7, A-2-4	0	60-100	50-100	30-100	15-80	10-60	NP-20
	34-61	Loamy coarse sand, loamy sand, gravelly loamy sand.	SM, SP-SM	A-2-4, A-1-b	0-5	70-100	55-98	40-85	5-25	---	NP
	61-65	Sand, gravelly sand, very gravelly coarse sand.	SP, SW, SP-SM, SW-SM	A-1-b, A-1-a	0-10	45-85	25-75	10-40	0-10	---	NP
KbB2, KcB2, KcC2- Kalamazoo	0-9	Silt loam--------	CL-ML, CL, ML	A-4, A-6	0	100	100	90-100	65-90	25-40	4-15
	9-32	Clay loam, sandy clay loam, silty clay loam.	SC, CL, CH, SM-SC	A-4, A-6, A-7-6, A-2-4	0	95-100	90-100	80-100	40-90	20-60	5-35
	32-46	Loamy coarse sand, loamy sand, gravelly loamy sand.	SM, SP-SM	A-2-4, A-1-b	0-5	70-100	55-98	40-85	5-25	---	NP
	46-60	Sand, gravelly sand, very gravelly coarse sand.	SP, SW, SP-SM, SW-SM	A-1-b, A-1-a	0-10	45-85	25-75	10-40	0-10	---	NP
KoD2-------------- Kosciusko	0-5	Sandy loam-------	SM, SC-SM, SC	A-2-4	0	80-100	75-98	60-80	25-40	<25	NP-10
	5-20	Gravelly sandy clay loam, gravelly sandy loam.	SC-SM, SC, SM	A-2-4	0-3	60-90	50-75	30-60	15-35	10-60	NP-20
	20-27	Gravelly loamy sand, very gravelly sandy loam, gravelly sandy loam.	SM, SC, SM-SC, SP-SM	A-1, A-2-4	0-5	40-90	40-75	20-55	5-25	<30	NP-10
	27-60	Stratified very gravelly coarse sand to coarse sand.	SP, SW, SP-SM, SW-SM	A-1-b, A-1-a	0-10	45-85	25-75	10-40	0-10	---	NP

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
KpC3-------------- Kosciusko	0-8	Gravelly sandy clay loam.	SC, SC-SM	A-2, A-2-4	0-3	60-90	50-75	30-60	15-35	20-60	5-20
	8-27	Gravelly sandy clay loam, gravelly sandy loam.	SC-SM, SC, SM	A-2	0-5	60-90	50-75	30-60	15-35	10-60	NP-20
	27-60	Stratified very gravelly coarse sand to coarse sand.	SP, SP-SM, GP, SW, SW-SM	A-1-a, A-1-b	0-10	45-85	25-75	10-40	0-10	---	NP
LaA--------------- Lafayette	0-13	Silt loam--------	CL-ML, CL, ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	13-40	Silt loam, silty clay loam.	CL, ML, CH	A-6, A-4, A-7-6	0	100	100	90-100	75-100	25-55	5-35
	40-45	Sandy clay loam, sandy loam.	SC, SM, SM-SC	A-6, A-4, A-2	0	90-100	75-100	45-85	20-50	10-60	NP-20
	45-65	Gravelly loam, gravelly sandy loam, loamy coarse sand.	SC-SM, SC, SM, SP-SM	A-2, A-4, A-6, A-1-b	0-5	60-100	50-98	30-60	5-40	<40	NP-20
	65-70	Gravelly coarse sand.	SP, SW, SP-SM, SW-SM	A-1-b	0-10	65-85	50-75	15-40	0-10	---	NP
LeA--------------- La Hogue	0-13	Loam-------------	CL, CL-ML	A-4, A-6	0	100	100	85-100	55-70	20-40	5-20
	13-42	Clay loam, sandy clay loam.	CL, SC, SM-SC	A-6, A-4, A-2, A-7-6	0	90-100	75-90	45-85	20-65	20-60	5-30
	42-47	Stratified sandy loam to loamy sand.	SC, SC-SM, SM	A-4, A-2-4	0	80-100	75-100	55-85	10-40	<30	NP-15
	47-60	Loam-------------	CL, CL-ML, ML	A-4, A-6	0-3	90-100	85-98	75-90	45-70	15-30	NP-15
Lm---------------- Lash	0-14	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	65-90	25-40	5-15
	14-52	Fine sandy loam, silt loam, loam.	CL, ML, SM, SC	A-4, A-6, A-2-4	0	100	100	85-100	30-90	10-40	NP-25
	52-60	Loamy sand, sand, loam.	SP-SM, SM, CL, CL-ML	A-4, A-6, A-2-4	0	100	100	65-100	15-80	<40	NP-25
LnA, LnB2--------- Lauramie	0-9	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	9-15	Silty clay loam, silt loam.	CL, ML	A-6, A-4, A-7-6	0	100	100	90-100	75-100	25-50	5-35
	15-44	Clay loam, loam, sandy clay loam.	CL, CL-ML	A-6, A-4, A-7-6	0	90-100	90-100	75-100	45-90	20-50	5-30
	44-50	Fine sandy loam	CL-ML, SC, SM	A-4	0-1	90-100	85-95	65-80	40-55	15-25	NP-10
	50-60	Fine sandy loam	CL-ML, SM, SC	A-4	0-3	90-100	85-95	65-80	40-55	15-25	NP-10
LoA, LoB---------- Linkville	0-15	Loam-------------	CL, CL-ML	A-4, A-6	0	100	100	85-100	55-70	20-40	5-20
	15-38	Loam, clay loam	CL, CL-ML	A-4, A-6, A-7-6	0	95-100	90-100	80-100	50-80	20-50	5-30
	38-70	Loam, clay loam	CL, CL-ML	A-4, A-6, A-7-6	0-1	95-100	90-100	85-95	55-80	20-50	5-30
	70-80	Loam-------------	CL, CL-ML, ML	A-4, A-6	0-3	90-100	85-98	75-90	45-70	15-30	NP-15

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
LvB2, LwB2-------Longlois	0-9	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	75-90	25-40	4-15
	9-16	Silty clay loam	CL	A-6, A-7-6	0	100	100	90-100	80-90	35-50	15-35
	16-25	Silty clay loam, clay loam, sandy clay loam.	CL, SC, SM-SC	A-6, A-7-6, A-2, A-4	0	90-100	75-90	45-85	20-65	20-60	15-30
	25-54	Gravelly sandy clay loam, very gravelly sandy clay loam.	CL, SC, SM-SC	A-6, A-7-6, A-2, A-4	0-5	45-85	25-75	15-70	10-55	20-60	5-30
	54-60	Stratified sand to gravelly loamy coarse sand.	SP, SW, SP-SM, GP-GM, SW-SM	A-1-b	0-10	65-85	50-75	15-50	0-15	---	NP
Mb---------------Mahalasville	0-13	Silty clay loam	CL, ML, CH	A-6, A-7-6	0	100	100	95-100	85-100	35-55	10-30
	13-33	Silty clay loam	CL, CH	A-7-6	0	100	100	95-100	90-100	40-65	20-40
	33-46	Clay loam, sandy clay loam.	CL, SC, SM-SC	A-4, A-6	0-1	90-100	75-90	45-85	20-65	20-60	5-30
	46-60	Gravelly coarse sand, gravelly loamy sand, gravelly sand.	SP, SW, SP-SM, SW-SM	A-1-b	0-5	65-85	50-75	15-70	0-20	---	NP
Mc---------------Mahalasville	0-10	Silty clay loam	CL, ML, CH	A-6, A-7	0	100	100	95-100	85-100	35-45	15-25
	10-33	Silty clay loam	CL, CH	A-6, A-7	0	100	100	95-100	90-100	35-45	15-25
	33-54	Clay loam, loam	CL, SC, SM-SC, CL-ML	A-6, A-7, A-4	0-3	85-100	75-98	55-90	40-65	20-60	5-30
	54-59	Loamy coarse sand	SP-SM, SM	A-2-4	0-3	85-100	75-100	40-60	5-15	---	NP
	59	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Md:											
Mahalasville----	0-12	Silty clay loam	CL, CH, ML	A-6, A-7-6	0	100	100	95-100	85-100	35-55	10-30
	12-38	Silty clay loam	CL, CH	A-7-6	0	100	100	95-100	90-100	40-65	20-40
	38-48	Loam, silt loam	ML, CL-ML, CL	A-6, A-4	0	95-100	95-100	85-100	60-95	20-40	NP-20
	48-60	Stratified silt to sand.	CL, SM, SP-SM, CL-ML	A-4, A-6, A-2-4, A-3	0	90-100	85-100	55-100	0-75	<40	NP-15
Treaty----------	0-10	Silty clay loam	CL, CH, ML	A-6, A-7-6	0	100	100	95-100	85-100	35-55	10-30
	10-37	Silty clay loam, silt loam.	CL, CH, ML, CL-ML	A-6, A-4, A-7-6	0	100	100	95-100	85-100	25-65	4-40
	37-48	Clay loam, silty clay loam, loam.	CL, CL-ML	A-6, A-4, A-7-6	0	95-100	90-100	85-95	55-80	20-50	5-30
	48-60	Loam, silt loam	CL-ML, CL, ML	A-4, A-6	0-3	90-100	85-98	75-90	45-70	15-30	NP-15
MmB2-------------Marker	0-8	Silt loam--------	CL, ML	A-6, A-4	0	100	95-100	85-100	70-100	30-40	4-20
	8-21	Clay loam--------	CL	A-6, A-7-6	0-1	95-100	90-100	85-100	60-85	30-50	10-30
	21-26	Silt loam--------	CL, ML	A-6, A-4	0-1	95-100	90-100	80-95	70-85	30-40	5-15
	26-60	Silt loam--------	CL, ML	A-6, A-4	0-3	95-100	90-100	80-95	70-85	30-35	5-15

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
MoA--------------- Mellott	0-9	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	9-28	Silty clay loam, silt loam.	CL, ML	A-6, A-7-6	0	100	100	90-100	75-100	25-50	5-35
	28-42	Loam, sandy clay loam.	CL, SC, SM-SC	A-6, A-4, A-2-6, A-2	0	90-100	75-100	45-85	20-65	20-60	NP-25
	42-50	Loam, fine sandy loam.	CL, CL-ML, SC, SM	A-4, A-6	0-1	90-100	85-98	65-90	40-70	20-40	NP-25
	50-60	Loam-------------	CL, CL-ML, ML	A-4, A-6	0-3	90-100	85-98	70-90	45-70	15-30	NP-15
MsC2, MsD2-------- Miami	0-9	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	9-27	Clay loam, silty clay loam, sandy clay loam.	CL, CL-ML	A-6, A-4, A-7-6	0	90-100	90-100	75-100	45-90	20-50	5-30
	27-35	Loam, fine sandy loam.	CL, SM, SC, CL-ML	A-4, A-6	0-1	90-100	85-98	65-90	40-70	20-40	5-25
	35-60	Loam, fine sandy loam.	CL, CL-ML, SC, ML	A-4, A-6	0-3	90-100	85-98	65-90	40-70	15-30	NP-15
MtC3, MtD3-------- Miami	0-7	Clay loam--------	CL	A-6, A-7-6	0	95-100	90-100	85-100	60-85	30-50	10-30
	7-23	Clay loam, silty clay loam, sandy clay loam.	CL	A-6, A-7-6	0	90-100	90-100	75-95	45-80	20-50	10-30
	23-29	Loam, fine sandy loam.	CL, SM, SC, CL-ML	A-4, A-6	0-1	90-100	85-98	65-90	40-70	20-40	5-25
	29-60	Loam, fine sandy loam.	CL, CL-ML, SC, ML	A-4, A-6	0-3	90-100	85-98	65-90	40-70	15-30	NP-15
Mu---------------- Milford	0-15	Silty clay loam	CL, CH, ML	A-6, A-7-6	0	100	100	95-100	80-100	35-55	10-30
	15-26	Silty clay-------	CL, CH	A-7-6	0	100	100	95-100	85-100	45-65	20-40
	26-54	Silty clay loam, silty clay, clay loam.	CL, CH, ML	A-7-6, A-4, A-6	0	100	100	85-100	70-100	20-65	5-40
	54-60	Silt loam, clay loam, silty clay loam.	CL, ML, CL-ML	A-6, A-7, A-4	0	100	100	85-100	70-100	20-60	NP-30
MwA--------------- Mulvey	0-9	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	9-29	Silt loam, silty clay loam.	CL, ML, CH	A-6, A-4, A-7-6	0	100	100	90-100	75-100	25-55	5-35
	29-41	Sandy clay loam, clay loam, loam.	CL, SC, SM-SC, CL-ML	A-4, A-6, A-2, A-7-6	0	85-100	75-100	45-90	20-65	20-60	5-30
	41-66	Gravelly sandy clay loam, gravelly sandy loam, gravelly coarse sandy loam.	SC, SC-SM, SM	A-2	0-5	55-90	50-75	25-60	15-35	10-60	NP-20
	66-80	Gravelly loamy coarse sand, gravelly coarse sand.	SP, SW, SP-SM, SM	A-1-b, A-2-4	0-10	65-85	50-75	15-50	0-15	---	NP

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
Mz---------------Muskego	0-10	Sapric material	PT	A-8	0	---	---	---	---	---	---
	10-39	Sapric material	PT	A-8	0	---	---	---	---	---	---
	39-60	Coprogenous earth	OL	A-5	0	95-100	95-100	85-100	75-100	40-50	2-8
OaB2:											
Oakville---------	0-8	Loamy fine sand	SM	A-2	0	100	100	90-100	20-35	---	NP
	8-80	Fine sand, loamy fine sand.	SM, SP-SM	A-2-4, A-3	0	100	100	85-100	0-35	---	NP
Billett----------	0-8	Fine sandy loam	SM, SC, SC-SM	A-4, A-2-4	0	100	100	80-100	25-50	<25	NP-10
	8-22	Fine sandy loam, sandy loam.	SM, SC, SC-SM	A-4, A-2-4	0	100	100	70-100	15-50	<25	NP-10
	22-80	Loamy fine sand, sandy loam, loamy sand.	SM, SC, SP-SM	A-2-4, A-4	0	100	100	70-95	10-35	<25	NP-10
OgA--------------Ockley	0-11	Silt loam--------	CL, ML, CL-ML	A-4, A-6	0	100	100	90-100	75-90	25-40	4-15
	11-42	Silty clay loam, clay loam, silt loam.	CL, ML, CH	A-6, A-4, A-7-6	0	90-100	75-100	55-100	50-90	20-60	5-35
	42-63	Gravelly clay loam, gravelly sandy clay loam, coarse sandy loam.	SC, SM, SM-SC	A-2-4	0-5	60-100	50-100	30-60	15-35	<60	NP-30
	63-70	Stratified sand to very gravelly coarse sand.	SP, SW, SP-SM, SW-SM	A-1-b, A-1-a	0-10	45-85	25-75	10-40	0-10	---	NP
OmB2, OmC2-------Octagon	0-8	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	8-37	Clay loam, sandy clay loam, silty clay loam.	CL, CL-ML	A-6, A-4, A-7-6	0-1	90-100	90-100	75-95	45-80	20-50	5-30
	37-60	Loam, fine sandy loam.	CL-ML, CL, SC, ML	A-4, A-6	0-3	90-100	85-98	65-90	40-70	15-30	NP-15
OpC3-------------Octagon	0-8	Clay loam--------	CL	A-6, A-7-6	0-1	95-100	90-100	85-100	60-85	30-50	10-30
	8-22	Clay loam, sandy clay loam, silty clay loam.	CL, CL-ML	A-6, A-4, A-7-6	0-1	90-100	90-100	75-95	45-80	20-50	5-30
	22-28	Loam, fine sandy loam.	CL, SM, CL-ML, SC	A-4, A-6	0-1	90-100	85-98	65-90	40-70	20-40	5-25
	28-60	Loam, fine sandy loam.	CL-ML, CL, SC, ML	A-4, A-6	0-3	90-100	85-98	65-90	40-70	15-30	NP-15
Ou---------------Ouiatenon	0-6	Sandy loam-------	SM, SC-SM, SC	A-2-4, A-4	0	90-100	85-100	70-95	25-45	<25	NP-10
	6-18	Coarse sand, loamy sand, sand.	SP-SM, SM	A-2-4, A-3	0	85-100	75-100	35-90	0-30	---	NP
	18-36	Coarse sand, loamy sand, sand.	SP-SM, SM	A-2-4, A-3	0	85-100	75-100	35-90	0-30	---	NP
	36-60	Very gravelly coarse sand, gravelly coarse sand, gravelly loamy sand.	SW, SW-SM, SP, SP-SM	A-1, A-2-4, A-3	0-10	45-85	25-75	10-70	0-20	---	NP

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Ox---------------- Ouiatenon	0-16	Loamy sand--------	SM, SP-SM	A-2-4	0	90-100	85-100	60-90	10-25	---	NP
	16-20	Coarse sand, loamy sand, sand.	SP-SM, SM	A-2-4, A-3	0	85-100	75-100	35-90	0-30	---	NP
	20-48	Coarse sand, loamy sand, sand.	SP-SM, SM	A-2-4, A-3	0	85-100	75-100	35-90	0-30	---	NP
	48-60	Very gravelly coarse sand, gravelly coarse sand, gravelly loamy sand.	SW, SW-SM, SP, SP-SM	A-1, A-2-4, A-3	0-10	45-85	25-75	10-70	0-20	---	NP
Oy---------------- Ouiatenon	0-13	Fine sandy loam	SM, SC-SM, SC	A-4, A-2-4	0	100	100	85-100	30-45	<25	NP-10
	13-21	Loamy sand--------	SM, SP-SM	A-2-4	0	100	100	75-90	15-30	---	NP
	21-60	Sand--------------	SP-SM, SM	A-2-4, A-3	0	100	100	65-90	5-15	---	NP
Pc---------------- Palms	0-36	Sapric material	PT	A-8	---	---	---	---	---	---	---
	36-60	Silt loam---------	CL-ML, CL, ML	A-4, A-6	0-3	85-100	80-100	80-95	60-85	25-40	NP-15
Pd---------------- Palms	0-42	Sapric material	PT	A-8	0	---	---	---	---	---	---
	42-60	Sand, gravelly coarse sand.	SP, SW, SP-SM, SW-SM	A-1-b	0-10	65-85	50-75	15-40	0-10	---	NP
Pg---------------- Pella	0-15	Silty clay loam	CL, CH, ML	A-7-6	0	100	100	95-100	85-100	35-55	10-30
	15-23	Silty clay loam, silty clay, clay loam.	CL, CH, ML	A-6, A-4, A-7-6	0	100	100	85-100	70-100	20-65	5-30
	23-31	Silt loam---------	CL, CL-ML, ML	A-6, A-4	0	100	100	95-100	70-100	25-40	NP-15
	31-60	Stratified sandy loam to silty clay loam.	SC-SM, SC, CL, SM, CL-ML	A-2-4, A-4, A-6, A-7-6	0-1	90-100	75-100	55-100	25-100	10-50	NP-25
Pk---------------- Peotone	0-19	Silty clay loam	CH, CL, ML	A-7-6	0	100	100	95-100	80-100	35-55	10-30
	19-50	Silty clay loam, silty clay.	CH, CL, ML	A-7-6	0	100	100	95-100	80-100	40-65	15-40
	50-60	Silty clay loam, silt loam.	CL, CL-ML, ML	A-7-6, A-6, A-4	0	100	95-100	95-100	70-100	25-50	NP-25
PmB--------------- Pinevillage	0-8	Gravelly sandy loam.	SC-SM, SC, SM	A-2-4	0-15	55-80	50-75	30-65	10-30	10-25	NP-10
	8-45	Gravelly sandy loam, very gravelly sandy loam, gravelly loam.	SC, SM-SC, SM, GC	A-2, A-1	5-40	40-90	25-75	20-55	5-25	<40	NP-20
	45-60	Extremely gravelly sandy loam, gravelly loamy sand, very gravelly loamy coarse sand.	GC, GP-GM, GM-GC, GM	A-1, A-2, A-3	5-30	30-85	20-75	10-70	0-20	<25	NP-10
Pt. Pits											

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
RaB2------------- Rainsville	0-9	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	9-14	Silty clay loam, silt loam.	CL, ML	A-6, A-7-6	0	100	100	90-100	75-90	30-50	5-35
	14-37	Loam, clay loam	CL, CL-ML	A-6, A-4, A-7-6	0-1	95-100	90-100	85-95	55-80	20-60	5-30
	37-41	Loam, sandy clay loam, sandy loam.	CL, SC, CL-ML, SM-SC	A-2, A-4, A-6	0-1	85-100	75-100	45-90	20-60	10-60	NP-20
	41-54	Loam, clay loam	CL, CL-ML	A-4, A-6, A-7-6	0-1	95-100	90-100	85-95	55-80	20-50	5-30
	54-60	Loam-------------	CL, CL-ML, ML	A-4, A-6	0-3	90-100	85-98	75-90	45-70	15-30	NP-15
RcA:											
Raub------------	0-11	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	11-34	Silty clay loam, silt loam.	CL, CH, ML	A-6, A-4, A-7-6	0	100	100	90-100	75-100	25-55	5-35
	34-53	Clay loam, loam	CL	A-6, A-7	0-1	95-100	90-100	85-95	55-80	35-50	15-25
	53-60	Loam-------------	CL, ML, CL-ML	A-4, A-6	0-3	90-100	85-98	75-90	45-70	15-30	NP-15
Brenton---------	0-11	Silt loam--------	CL, ML, CL-ML	A-6, A-4	0	100	100	90-100	75-100	25-40	4-15
	11-38	Silty clay loam, silt loam.	CL, ML, CH	A-6, A-7, A-4	0	100	100	90-100	75-100	25-55	5-35
	38-52	Sandy loam, sand, silt loam.	SC, SM, ML, CL	A-6, A-7, A-4, A-2-4	0	90-100	85-100	55-95	0-75	<40	NP-15
	52-60	Stratified sand to silt loam.	CL-ML, CL, SM, SP-SM	A-2-4, A-4, A-6, A-3	0	90-100	85-100	55-100	0-75	<40	NP-15
RdA, RdB2, RdC2-- Richardville	0-7	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	7-13	Clay loam, silty clay loam.	CL, ML	A-6, A-7-6	0	95-100	90-100	85-100	55-90	30-50	10-35
	13-41	Sandy clay loam	SC, CL, SC-SM	A-6, A-4, A-2	0	90-100	75-100	45-95	20-55	20-60	5-20
	41-51	Sandy clay loam, fine sandy loam.	CL, CL-ML, SM	A-4, A-6, A-7-6	0-1	90-100	85-98	60-95	30-60	15-50	NP-30
	51-60	Sandy loam, fine sandy loam.	SM, SC	A-4	0-3	90-100	85-98	60-80	40-50	15-25	NP-10
RoB------------- Rockfield	0-10	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	10-25	Silty clay loam, silt loam.	CL, ML	A-6, A-7-6	0	100	100	90-100	75-100	30-50	5-35
	25-46	Clay loam, loam	CL, CL-ML	A-6, A-4, A-7-6	0	95-100	90-100	80-100	50-80	20-60	5-30
	46-67	Loam, clay loam	CL, CL-ML	A-6, A-4, A-7-6	0-1	95-100	90-98	85-95	55-80	20-50	5-30
	67-80	Loam-------------	CL, CL-ML, ML	A-4, A-6	0-3	90-100	85-98	75-90	45-70	15-30	NP-15

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
RsF---------------- Rodman	0-10	Gravelly loam----	SC, SM-SC	A-4, A-6	0-5	60-85	50-75	35-55	25-40	20-40	5-20
	10-15	Gravelly loam, gravelly sandy loam, gravelly loamy coarse sand.	SP-SM, SC, SM, SM-SC	A-2, A-1	0-5	55-85	50-75	25-55	0-25	<40	NP-20
	15-60	Stratified sand to extremely gravelly coarse sand.	SP, SP-SM, GP, GP-GM	A-1	0-10	45-65	25-50	10-20	0-10	---	NP
Rz---------------- Ross	0-17	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	100	100	95-100	75-100	25-40	5-15
	17-39	Loam, silt loam, silty clay loam.	ML, CL, CL-ML	A-6, A-4, A-7	0	100	100	90-100	55-100	20-50	5-25
	39-60	Sandy loam-------	SM-SC, SM, SC	A-4, A-2-4	0	100	100	90-100	25-45	10-30	NP-10
Sd---------------- Saranac	0-18	Silty clay-------	CH, CL, MH	A-7	0	100	100	95-100	90-100	40-60	15-40
	18-58	Silty clay loam, silty clay, silt loam.	CL, ML, CL-ML, CH	A-6, A-7, A-4	0	100	95-100	90-100	70-100	25-65	5-40
	58-70	Stratified silt loam to gravelly loamy coarse sand.	SP, SM, SP-SM	A-1, A-2-4	0-10	65-85	50-75	25-50	0-15	---	NP
Sf---------------- Sawabash	0-9	Silty clay loam	CL, ML	A-6, A-7	0	100	100	95-100	90-100	35-50	10-25
	9-46	Silty clay loam	CL, ML	A-6, A-7	0	100	100	95-100	90-100	35-50	10-25
	46-55	Silty clay loam	CL, ML	A-6, A-7	0	100	100	95-100	90-100	35-50	10-25
	55-60	Silty clay loam	CL, ML	A-6, A-7	0	100	100	95-100	90-100	35-50	10-25
ShB--------------- Shadeland	0-8	Silt loam--------	CL, ML, CL-ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	8-16	Silt loam, silty clay loam, clay loam.	CL, ML, CL-ML	A-6, A-4, A-7-6	0	80-100	75-100	70-100	50-100	20-50	5-35
	16-27	Clay loam--------	CL	A-6, A-4, A-7	0-1	80-100	75-100	70-95	50-85	20-60	5-30
	27-34	Clay loam, channery clay loam.	CL, SC, SM-SC	A-4, A-6, A-7-6	1-5	60-100	50-95	45-90	35-85	20-60	5-30
	34	Weathered bedrock	---	---	---	---	---	---	---	---	---
SmA--------------- Sleeth	0-10	Loam-------------	ML, CL-ML	A-4, A-6	0	100	100	85-100	55-70	20-40	5-20
	10-47	Clay loam, loam, sandy clay loam.	CL, SC, SM-SC, CL-ML	A-6, A-4, A-7-6, A-2	0	90-100	75-100	45-90	20-65	20-60	5-30
	47-58	Gravelly sandy loam, gravelly sandy clay loam, gravelly loamy sand.	SC, SM, SM-SC	A-2	0-5	60-90	50-75	30-60	15-35	10-60	NP-20
	58-70	Stratified sand to gravelly sand.	SP, SW, SP-SM, SW-SM	A-1-b	0-10	65-85	50-75	15-40	0-10	---	NP

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
Sn---------------- Sloan	0-16	Clay loam--------	CL	A-6, A-7-6	0	100	100	75-100	55-85	30-50	10-30
	16-32	Clay loam, loam	CL	A-6, A-7-6	0	100	100	75-100	55-85	30-50	10-30
	32-60	Stratified gravelly sandy loam to silty clay loam.	CL, SC, SM, SM-SC	A-4, A-6, A-2-4	0	85-100	70-100	50-90	25-60	10-40	NP-15
So---------------- Sloan Variant	0-10	Silty clay loam	CL, ML	A-6, A-7	0-3	95-100	90-100	85-100	75-95	35-50	10-25
	10-17	Silty clay loam	CL, ML	A-6, A-7	0-3	95-100	90-100	85-100	75-95	35-50	10-25
	17-33	Very channery sandy clay loam, extremely channery sandy clay loam.	GP-GC, GC	A-2	0-10	30-55	20-50	20-45	5-25	30-40	10-18
	33	Weathered bedrock	---	---	---	---	---	---	---	---	---
SrB, SrC---------- Sparta	0-19	Sand-------------	SP-SM, SM	A-3, A-2	0	100	100	70-90	5-15	---	NP
	19-48	Sand-------------	SP-SM, SM	A-2, A-3, A-4	0	100	100	70-90	5-15	---	NP
	48-80	Sand, loamy sand	SP-SM, SM, SP	A-2, A-3	0	100	100	70-90	5-30	---	NP
StC--------------- Spinks	0-9	Fine sand--------	SP-SM, SM	A-2-4, A-3	0	100	100	85-95	5-15	---	NP
	9-21	Sand, fine sand	SM, SP-SM	A-2-4, A-3	0	100	100	70-95	5-15	---	NP
	21-68	Fine sand, loamy fine sand.	SM, SP-SM	A-2-4, A-3	0	100	100	85-95	5-25	---	NP
	68-80	Fine sand, sand	SP-SM, SM	A-2-4, A-3	0	100	100	70-95	5-25	---	NP
SwA:											
Starks-----------	0-10	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	10-38	Silty clay loam	CL, CH	A-6, A-7-6	0	100	100	90-100	80-100	35-55	15-35
	38-56	Loam, silt loam, sandy loam.	CL, SC, CL-ML, SC-SM	A-4, A-6, A-2-4	0	90-100	85-100	60-95	25-85	10-40	NP-20
	56-70	Stratified loamy sand to silt loam.	SM, CL-ML, CL, SP-SM	A-2-4, A-4, A-6, A-3	0	90-100	85-100	55-100	0-75	<40	NP-15
Fincastle--------	0-10	Silt loam--------	CL, ML, CL-ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	10-39	Silty clay loam, silt loam.	CL, ML, CH	A-6, A-4, A-7-6	0	100	100	90-100	75-100	25-55	5-35
	39-54	Clay loam, loam	CL, CL-ML	A-6, A-4, A-7-6	0	95-100	90-100	85-95	55-80	20-50	5-30
	54-60	Loam-------------	CL, ML, CL-ML	A-4, A-6	0-3	90-100	85-98	65-90	45-70	15-30	NP-15
SyF:											
Strawn-----------	0-9	Loam-------------	CL, ML, CL-ML	A-4, A-6	0	95-100	90-100	85-95	55-70	15-40	NP-15
	9-16	Clay loam, loam	CL, CL-ML	A-6, A-4	0-5	95-100	90-100	85-95	55-80	20-40	5-25
	16-60	Loam-------------	CL, ML, CL-ML	A-4, A-6	0-5	90-100	85-98	65-90	45-70	15-30	NP-15

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
SyF:											
Rodman----------	0-5	Gravelly sandy loam.	SC-SM, SM, SC	A-2-4	0-5	55-80	50-75	35-65	10-30	<25	NP-10
	5-15	Gravelly coarse sandy loam, gravelly loamy coarse sand.	SC, SM	A-2-4, A-1-b	0-5	50-75	25-55	0-24	20-55	<40	NP-20
	15-60	Stratified sand to extremely gravelly coarse sand.	SP, GW-GM, SW, SW-SM	A-1	1-10	45-65	25-50	5-40	0-10	---	NP
TbA-------------- Tecumseh	0-15	Silt loam--------	CL-ML, CL, ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	15-30	Silty clay loam	CL, ML	A-6, A-7-6	0	100	100	90-100	75-100	35-50	15-35
	30-48	Clay loam, sandy clay loam, fine sandy loam.	CL, SC-SM, SC, SM	A-2, A-7-6, A-4, A-6	0	95-100	90-100	80-95	25-75	10-60	NP-30
	48-65	Loam-------------	CL-ML, CL	A-4, A-6	0-1	95-100	90-100	85-95	55-70	20-40	5-25
	65-75	Loam-------------	CL-ML, CL	A-4, A-6	0-1	95-100	90-100	85-95	55-70	20-40	5-25
	75-80	Fine sandy loam	SM, SC	A-4	0-3	90-100	85-98	65-80	40-50	15-25	NP-10
TcA-------------- Thackery	0-10	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	100	100	90-100	75-90	25-40	4-15
	10-16	Silt loam, silty clay loam.	CL, ML, CL-ML	A-6, A-7-6	0	100	100	90-100	75-90	25-50	5-35
	16-48	Clay loam, sandy clay loam.	CL, SC, SM-SC	A-6, A-4, A-2, A-7-6	0	90-100	75-100	45-95	20-75	20-60	5-30
	48-54	Gravelly sandy clay loam, gravelly sandy loam.	SM, SC, SM-SC	A-2	0-5	60-90	50-75	30-60	15-35	10-60	NP-20
	54-60	Stratified sand to gravelly sand.	SW, SP, SP-SM, SW-SM	A-1-b	0-10	65-85	50-75	15-40	0-10	---	NP
TfB-------------- Throckmorton	0-9	Silt loam--------	CL-ML, CL, ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	9-34	Silt loam, silty clay loam.	CL, ML	A-6, A-7-6	0	100	100	90-100	75-100	25-50	5-35
	34-45	Clay loam, sandy loam, sandy clay loam.	CL, SC-SM, SC, SM	A-6, A-4, A-2, A-7-6	0	90-100	85-100	80-95	25-75	10-60	NP-30
	45-58	Loam-------------	CL, CL-ML	A-4, A-6	0-1	95-100	90-100	85-95	55-70	20-40	5-25
	58-60	Loam-------------	CL-ML, ML	A-4, A-6	0-3	90-100	85-98	75-90	45-70	15-30	NP-15
Tg--------------- Tice	0-14	Silty clay loam	CL, ML	A-6, A-7	0	100	100	95-100	80-100	35-50	10-25
	14-50	Silty clay loam	CL, ML	A-7, A-6	0	100	100	95-100	80-100	35-50	10-25
	50-60	Stratified silty clay loam to loam.	CL-ML, CL, ML	A-4, A-6, A-7	0	100	100	90-100	55-100	20-50	5-25
TmA:											
Toronto---------	0-9	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	9-27	Silty clay loam, silty clay.	CL, ML, CH	A-6, A-7-6	0	100	100	90-100	75-100	35-65	15-40
	27-52	Clay loam, loam	CL, CL-ML	A-6, A-4, A-7-6	0-1	95-100	90-100	85-95	55-80	20-50	5-30
	52-60	Loam-------------	CL, CL-ML, ML	A-4, A-6	0-3	90-100	85-98	75-90	45-70	15-30	NP-15

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
TmA:											
Millbrook-------	0-9	Silt loam--------	CL, CL-ML, ML	A-6, A-4	0	100	100	90-100	75-100	25-40	4-15
	9-29	Silty clay loam	CL, ML	A-6, A-7-6	0	100	100	90-100	80-100	35-55	15-35
	29-49	Clay loam, loam, sandy loam.	SC, CL, CL-ML, SM-SC	A-6, A-4, A-7-6, A-2	0	95-100	90-100	75-95	25-75	10-60	NP-30
	49-60	Stratified loamy sand to silt loam.	SM, CL, CL-ML, SP-SM	A-4, A-6, A-2-4, A-3	0	90-100	85-100	55-100	0-75	<40	NP-15
TnB2:											
Toronto---------	0-9	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	9-25	Silty clay loam	CL, ML, CH	A-6, A-7-6	0	100	100	90-100	75-100	35-65	15-40
	25-42	Clay loam, loam	CL, CL-ML	A-6, A-4, A-7-6	0-1	95-100	90-100	85-95	55-80	20-50	5-30
	42-60	Loam-------------	CL, CL-ML, ML	A-4, A-6	0-3	90-100	85-98	75-90	45-70	15-30	NP-15
Octagon---------	0-8	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	8-37	Clay loam, loam, sandy clay loam.	CL, CL-ML	A-6, A-4, A-7-6	0-1	90-100	90-100	75-95	45-80	20-50	5-30
	37-60	Loam, fine sandy loam.	CL-ML, CL, SC, ML	A-4, A-6	0-3	90-95	85-98	65-90	40-70	15-30	NP-15
TtA-------------- Troxel	0-12	Silty clay loam	CL, ML, CH	A-6, A-7	0	100	100	90-100	80-100	35-55	10-30
	12-42	Silt loam, silty clay loam, clay loam.	CL, CH, ML	A-6, A-7-6	0	100	100	85-100	55-100	20-60	5-35
	42-71	Fine sandy loam, loam, sandy loam.	CL, CL-ML, SC, SM-SC	A-6, A-4, A-2-4	0	95-100	90-100	70-100	25-80	10-40	NP-20
	71-80	Gravelly coarse sand.	SW, SP, SW-SM, SP-SM	A-1-b	0-10	65-85	50-75	15-40	0-10	---	NP
Ua. Udorthents											
UbB: Urban land.											
Billett---------	0-8	Loam-------------	ML, CL-ML	A-4, A-6	0	95-100	90-100	75-85	50-65	20-40	5-20
	8-20	Loam-------------	SC, SC-SM, CL, CL-ML	A-6, A-4	0	85-100	75-100	60-90	40-60	20-40	5-20
	20-30	Sandy loam-------	SC, SC-SM, SM	A-2-4, A-4	0-2	90-100	75-100	55-85	25-40	10-30	NP-10
	30-43	Loamy sand-------	SM, SP-SM, SC-SM	A-1, A-3, A-2-4	0-5	85-100	75-100	55-85	10-25	---	NP
	43-60	Gravelly coarse sand.	SP, SW-SM, SW, SP-SM	A-1-b	1-10	65-85	50-75	15-40	0-10	---	NP
UcA: Urban land.											

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
UcA:											
Carmi	0-19	Loam	CL-ML, ML	A-4, A-6	0	90-100	90-100	75-85	50-65	20-40	5-20
	19-43	Gravelly loamy sand, loam, gravelly sandy loam.	SC-SM, SM, CL-ML	A-2-4, A-4, A-6	0-5	60-85	50-80	35-70	10-60	10-40	NP-20
	43-60	Sand, very gravelly coarse sand.	SP-SM, SW-SM, SW	A-1-b, A-1-a	0-15	45-85	25-75	10-40	0-10	---	NP
UmB, UmC:											
Urban land.											
Miami	0-10	Silt loam	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	10-23	Clay loam, silty clay loam, sandy clay loam.	CL, CL-ML	A-6, A-4, A-7-6	0	90-100	90-100	75-100	45-90	20-50	5-30
	23-36	Loam, fine sandy loam.	CL, SC, CL-ML, SM	A-4, A-6	0-1	90-100	85-95	65-90	40-70	20-40	5-25
	36-60	Loam, fine sandy loam.	CL, CL-ML, SC, ML	A-4, A-6	0-3	90-100	85-98	65-90	40-70	15-30	NP-15
UsA:											
Urban land.											
Starks	0-9	Silt loam	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	9-32	Silty clay loam	CL, CH	A-6, A-7-6	0	100	100	90-100	80-100	35-55	15-35
	32-57	Loam, silt loam, sandy loam.	CL, SC, CL-ML, SC-SM	A-4, A-6, A-2-4	0	90-100	85-100	60-95	25-85	10-40	NP-20
	57-70	Stratified loamy sand to silt loam.	SM, CL, CL-ML, SP-SM	A-2-4, A-4, A-6, A-3	0	90-100	85-100	55-100	0-75	<40	NP-15
Fincastle	0-11	Silt loam	CL, ML, CL-ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	11-38	Silty clay loam, silt loam.	CL, ML, CH	A-6, A-4, A-7-6	0	100	100	90-100	75-100	25-55	5-35
	38-46	Clay loam, loam	CL, CL-ML	A-6, A-4, A-7-6	0-1	95-100	90-100	85-95	55-80	20-50	5-30
	46-60	Loam	CL, ML, CL-ML	A-4, A-6	0-3	90-100	85-98	65-90	45-70	15-30	NP-15
Wb: Wallkill	0-10	Silt loam	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	10-27	Silt loam	CL, ML, CL-ML	A-6, A-4	0	100	100	90-100	75-100	25-40	4-15
	27-54	Sapric material	PT	A-8	0	---	---	---	---	---	---
	54-60	Coprogenous earth	CL, CH	A-6, A-7	0	100	100	95-100	80-100	30-60	15-30
We: Washtenaw	0-10	Silt loam	ML, CL, CL-ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	10-23	Silt loam	CL, ML, CL-ML	A-6, A-4	0	100	100	90-100	75-100	25-40	4-15
	23-50	Silty clay loam, clay loam.	CL, ML, CH	A-6, A-7-6	0-1	85-100	80-100	70-95	50-90	30-55	5-35
	50-70	Loam	CL, ML, CL-ML	A-4, A-6	0-3	90-100	85-98	75-90	45-70	15-30	NP-15

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
WgA-------------- Waupecan	0-11	Silt loam--------	CL, ML, CL-ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	11-35	Silty clay loam, silt loam.	CL, ML	A-6, A-4, A-7-6	0	100	100	90-100	75-100	25-50	5-35
	35-61	Sandy loam, gravelly loamy sand, gravelly clay loam.	SM, SC, SM-SC, SP-SM	A-2-4, A-4, A-6, A-7-6	0-5	70-100	50-98	35-85	10-40	10-60	NP-30
	61-70	Gravelly sand, gravelly coarse sand.	SP, SW, SP-SM, SW-SM	A-1-b	0-10	65-85	50-75	15-40	0-10	---	NP
WhA-------------- Waupecan	0-15	Silt loam--------	CL, ML, CL-ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	15-36	Silt loam, silty clay loam.	CL, ML	A-6, A-4, A-7-6	0	100	100	90-100	75-100	25-50	5-35
	36-58	Gravelly loamy sand, gravelly clay loam, sandy loam.	SM, SC, SM-SC, SP-SM	A-2-4, A-4, A-6, A-7-6	0-5	70-100	50-98	30-85	10-40	10-60	NP-30
	58-65	Gravelly sand, gravelly coarse sand.	SP, SP-SM	A-1-b	0-10	65-85	50-75	15-40	0-10	---	NP
WmA-------------- Waynetown	0-10	Silt loam--------	CL-ML, CL, ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	10-26	Silty clay loam	CL, CH, MH	A-6, A-7-6	0	100	100	90-100	75-100	35-55	15-35
	26-32	Loam, clay loam	CL, CL-ML	A-6, A-4, A-7-6	0	90-100	75-100	55-85	50-65	20-60	5-30
	32-53	Gravelly sandy clay loam, gravelly sandy loam, gravelly clay loam.	SC, SM, SM-SC	A-2-4, A-2-6	0-5	60-90	50-75	30-60	15-50	10-60	NP-30
	53-60	Gravelly coarse sand, coarse sand.	SP, SP-SM, SW, SW-SM	A-1-b	0-10	65-85	50-75	15-40	0-10	---	NP
WtA-------------- Wea	0-10	Silt loam--------	CL, ML, CL-ML	A-4, A-6	0	100	100	90-100	75-100	25-40	4-15
	10-25	Silt loam--------	CL, ML	A-4, A-6	0	100	100	90-100	65-100	25-40	5-20
	25-31	Clay loam, sandy clay loam.	CL, SC, SM-SC	A-4, A-6, A-7-6	0	95-100	90-100	80-95	40-75	20-60	5-30
	31-64	Sandy loam, gravelly sandy clay loam, gravelly sandy loam.	SC, SC-SM, SM	A-2-4	0-5	60-100	50-95	30-85	15-35	10-60	NP-20
	64-70	Sand, gravelly sand.	SP-SM, SP, SW, SW-SM	A-1-b	0-10	65-85	50-75	15-40	0-10	---	NP
WuA-------------- Whitaker	0-10	Loam-------------	CL, CL-ML	A-4, A-6	0	100	100	85-100	55-70	20-40	5-20
	10-17	Loam-------------	CL, CL-ML	A-6, A-4	0	100	100	90-100	50-80	20-40	5-20
	17-50	Clay loam, sandy clay loam.	CL, SC, SM-SC	A-4, A-6, A-7-6	0	95-100	90-100	80-95	40-75	20-60	5-30
	50-58	Sandy loam, loamy sand.	SM, SC-SM, SP-SM, SC	A-2-4, A-4	0-1	100	95-100	60-95	10-50	<30	NP-10
	58-70	Loam-------------	ML, CL-ML, CL	A-4, A-6	0-3	90-100	85-98	75-90	45-70	15-30	NP-15

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
Am, Ap-----------	0-18	20-27	1.30-1.60	0.6-2.0	0.21-0.24	6.1-8.4	Low-----------	0.28	5	6	2-4
Allison	18-51	25-35	1.40-1.60	0.6-2.0	0.18-0.21	6.1-8.4	Moderate-----	0.28			
	51-80	25-40	1.40-1.60	0.6-2.0	0.15-0.21	6.1-8.4	Moderate-----	0.28			
AtB2:											
Alvin-----------	0-10	10-15	1.40-1.70	2.0-6.0	0.16-0.18	4.5-7.3	Low-----------	0.24	5	3	.5-1
	10-27	10-15	1.50-1.70	2.0-6.0	0.14-0.20	4.5-7.3	Low-----------	0.24			
	27-38	15-18	1.50-1.70	2.0-6.0	0.12-0.20	4.5-6.0	Low-----------	0.24			
	38-60	3-10	1.50-1.70	2.0-6.0	0.05-0.13	5.1-8.4	Low-----------	0.24			
Spinks----------	0-8	0-10	1.40-1.70	6.0-20	0.06-0.08	5.1-7.3	Low-----------	0.15	5	1	.5-1
	8-28	0-15	1.50-1.70	2.0-20	0.05-0.10	5.6-7.3	Low-----------	0.17			
	28-61	3-15	1.50-1.70	2.0-6.0	0.04-0.08	5.6-7.8	Low-----------	0.17			
	61-70	0-10	1.50-1.70	6.0-20	0.04-0.06	6.6-8.4	Low-----------	0.17			
Ba, Bb-----------	0-10	20-27	1.30-1.60	0.6-2.0	0.21-0.24	7.4-8.4	Low-----------	0.28	5	4L	2-5
Battleground	10-19	20-35	1.40-1.60	0.6-2.0	0.21-0.24	7.4-8.4	Moderate-----	0.28			
	19-80	15-35	1.40-1.70	0.6-2.0	0.18-0.22	7.4-8.4	Moderate-----	0.43			
BgA--------------	0-9	20-27	1.20-1.50	0.2-0.6	0.22-0.24	4.5-6.0	Low-----------	0.37	3	6	2-4
Beecher	9-41	35-40	1.40-1.60	0.6-2.0	0.11-0.19	4.5-6.5	Moderate-----	0.37			
	41-60	27-30	1.70-1.90	0.06-0.2	0.14-0.20	7.4-8.4	Moderate-----	0.37			
BkF--------------	0-8	5-23	1.20-1.50	0.6-6.0	0.08-0.12	3.6-6.5	Low-----------	0.17	3	---	.5-3
Berks	8-17	5-27	1.40-1.60	0.6-2.0	0.04-0.10	3.6-6.5	Low-----------	0.17			
	17-29	5-20	1.40-1.60	2.0-6.0	0.04-0.10	3.6-6.5	Low-----------	0.17			
	29	---	---	---	---	---	-------------	----			
BlA, BlB2--------	0-9	8-15	1.40-1.70	2.0-6.0	0.16-0.18	4.5-7.3	Low-----------	0.20	4	3	1-3
Billett	9-30	10-20	1.50-1.70	2.0-6.0	0.12-0.19	5.1-7.3	Low-----------	0.32			
	30-39	10-18	1.50-1.70	2.0-6.0	0.11-0.16	5.1-7.3	Low-----------	0.24			
	39-60	5-15	1.60-1.80	6.0-20	0.08-0.10	5.6-7.3	Low-----------	0.17			
	60-65	1-5	1.60-1.80	>20	0.02-0.04	7.4-8.4	Low-----------	0.10			
BmA--------------	0-9	5-15	1.40-1.70	2.0-6.0	0.13-0.18	4.5-7.8	Low-----------	0.20	4	3	1-2
Billett	9-22	6-18	1.50-1.70	2.0-6.0	0.10-0.17	4.5-7.3	Low-----------	0.20			
	22-80	3-10	1.50-1.70	2.0-6.0	0.07-0.14	5.1-7.3	Low-----------	0.20			
BnA, BnB2--------	0-9	8-15	1.40-1.70	2.0-6.0	0.20-0.22	4.5-7.3	Low-----------	0.28	4	5	1-3
Billett	9-27	10-20	1.50-1.70	2.0-6.0	0.12-0.19	5.1-7.3	Low-----------	0.32			
	27-38	10-18	1.50-1.70	2.0-6.0	0.11-0.16	5.1-7.3	Low-----------	0.24			
	38-56	5-15	1.60-1.80	6.0-20	0.08-0.10	5.6-7.3	Low-----------	0.17			
	56-60	1-5	1.60-1.80	>20	0.02-0.04	7.4-8.4	Low-----------	0.10			
BoA--------------	0-9	15-27	1.30-1.60	0.6-2.0	0.21-0.24	5.6-7.3	Low-----------	0.32	5	6	2-4
Bowes	9-28	25-35	1.40-1.60	0.6-2.0	0.18-0.20	5.1-6.5	Moderate-----	0.43			
	28-56	3-30	1.50-1.70	2.0-6.0	0.10-0.16	5.1-7.8	Low-----------	0.17			
	56-60	1-5	1.60-1.80	>20	0.02-0.04	7.9-8.4	Low-----------	0.10			
BpA--------------	0-9	15-27	1.30-1.60	0.6-2.0	0.22-0.24	5.1-7.3	Low-----------	0.32	5	5	2-4
Bowes Variant	9-26	25-35	1.40-1.60	0.6-2.0	0.18-0.22	4.5-6.5	Moderate-----	0.43			
	26-53	10-30	1.50-1.70	2.0-6.0	0.10-0.14	4.5-7.3	Moderate-----	0.24			
	53-60	1-5	1.60-1.80	>20	0.02-0.04	7.4-8.4	Low-----------	0.10			

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodi-bility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
CaA--------------- Camden	0-9	15-27	1.30-1.60	0.6-2.0	0.22-0.24	5.1-7.3	Low-----------	0.37	5	6	1-2
	9-29	25-35	1.40-1.60	0.6-2.0	0.16-0.20	5.1-7.3	Moderate-----	0.37			
	29-64	10-27	1.40-1.60	0.6-2.0	0.11-0.22	5.1-7.3	Low-----------	0.37			
	64-70	5-20	1.50-1.70	0.6-2.0	0.11-0.22	5.6-8.4	Low-----------	0.37			
CfB--------------- Carmi	0-13	10-20	1.40-1.70	2.0-6.0	0.13-0.20	5.1-7.8	Low-----------	0.20	4	3	2-4
	13-45	5-22	1.50-1.70	2.0-6.0	0.12-0.19	4.5-7.8	Low-----------	0.20			
	45-60	1-5	1.60-1.80	>6.0	0.02-0.04	7.9-8.4	Low-----------	0.15			
CgA--------------- Carmi	0-20	10-20	1.30-1.60	0.6-2.0	0.13-0.20	5.1-7.8	Low-----------	0.28	4	5	2-4
	20-54	5-22	1.40-1.70	2.0-6.0	0.12-0.19	4.5-7.8	Low-----------	0.20			
	54-60	1-5	1.60-1.80	>6.0	0.02-0.07	7.9-8.4	Low-----------	0.15			
Ck---------------- Ceresco	0-16	2-15	1.40-1.70	2.0-6.0	0.13-0.18	6.1-7.8	Low-----------	0.20	4	3	3-5
	16-40	10-20	1.50-1.70	2.0-6.0	0.08-0.19	6.1-7.8	Low-----------	0.24			
	40-60	0-10	1.60-1.80	>20	0.02-0.04	7.9-8.4	Low-----------	0.10			
Cl---------------- Ceresco	0-13	10-15	1.30-1.60	0.6-2.0	0.20-0.24	6.1-7.8	Low-----------	0.24	4	5	3-5
	13-31	10-20	1.50-1.70	2.0-6.0	0.08-0.19	6.1-7.8	Low-----------	0.24			
	31-60	0-10	1.60-1.80	>20	0.02-0.04	7.9-8.4	Low-----------	0.10			
Cm---------------- Chalmers	0-13	28-35	1.20-1.60	0.6-2.0	0.21-0.23	6.1-7.3	Moderate-----	0.28	5	7	3-6
	13-30	20-35	1.40-1.60	0.6-2.0	0.18-0.21	6.6-7.8	Moderate-----	0.28			
	30-45	15-35	1.50-1.70	0.6-2.0	0.17-0.20	6.6-7.8	Moderate-----	0.28			
	45-60	12-18	1.70-1.90	0.2-0.6	0.05-0.12	7.4-8.4	Low-----------	0.28			
Co---------------- Cohoctah	0-13	5-20	1.40-1.70	2.0-6.0	0.13-0.18	6.1-7.8	Low-----------	0.20	4	3	3-6
	13-32	5-27	1.50-1.70	2.0-6.0	0.12-0.20	6.1-8.4	Low-----------	0.28			
	32-60	5-10	1.60-1.80	>20	0.02-0.04	7.9-8.4	Low-----------	0.10			
Cp---------------- Cohoctah	0-20	10-20	1.30-1.60	2.0-6.0	0.20-0.22	6.1-7.8	Low-----------	0.28	4	5	3-6
	20-45	5-25	1.50-1.70	2.0-6.0	0.12-0.20	6.1-8.4	Low-----------	0.28			
	45-60	5-10	1.60-1.80	>20	0.02-0.04	7.9-8.4	Low-----------	0.10			
CrC--------------- Coloma	0-8	0-10	1.40-1.70	6.0-20	0.05-0.09	4.5-7.3	Low-----------	0.15	5	1	<1
	8-34	0-10	1.50-1.70	6.0-20	0.05-0.12	4.5-6.5	Low-----------	0.15			
	34-60	2-12	1.50-1.70	6.0-20	0.03-0.08	4.5-6.0	Low-----------	0.15			
CtA--------------- Crosby	0-9	15-27	1.30-1.60	0.6-2.0	0.20-0.24	5.1-7.3	Low-----------	0.43	3	5	1-3
	9-29	25-35	1.50-1.70	0.06-0.2	0.15-0.20	5.1-7.3	Moderate-----	0.43			
	29-60	12-18	1.70-2.00	0.06-0.2	0.05-0.17	7.4-8.4	Low-----------	0.43			
CwB2:											
Crosby-----------	0-9	11-24	1.30-1.60	0.6-2.0	0.20-0.24	5.1-7.3	Low-----------	0.43	3	5	1-3
	9-31	28-35	1.50-1.70	0.06-0.2	0.15-0.20	5.1-7.3	Moderate-----	0.43			
	31-60	12-18	1.70-2.00	0.06-0.2	0.05-0.17	7.4-8.4	Low-----------	0.43			
Miami------------	0-9	15-27	1.30-1.60	0.6-2.0	0.20-0.24	5.6-7.3	Low-----------	0.37	4	5	1-3
	9-36	25-35	1.50-1.70	0.2-2.0	0.15-0.20	5.1-7.3	Moderate-----	0.37			
	36-60	12-18	1.70-2.00	0.06-0.2	0.05-0.10	7.4-8.4	Low-----------	0.37			
DmC2-------------- Desker	0-8	12-18	1.40-1.70	2.0-6.0	0.11-0.13	5.6-6.5	Low-----------	0.15	4	3	2-4
	8-14	12-18	1.50-1.70	2.0-6.0	0.09-0.12	5.6-7.3	Low-----------	0.17			
	14-27	4-10	1.60-1.80	6.0-20	0.06-0.09	6.6-8.4	Low-----------	0.15			
	27-60	1-5	1.60-1.80	>20	0.02-0.04	7.9-8.4	Low-----------	0.10			
DoC2-------------- Desker	0-9	7-15	1.40-1.70	2.0-6.0	0.12-0.15	5.6-6.5	Low-----------	0.20	4	3	2-4
	9-15	12-18	1.50-1.70	2.0-6.0	0.09-0.12	5.6-7.3	Low-----------	0.17			
	15-34	4-10	1.60-1.80	6.0-20	0.06-0.09	6.6-8.4	Low-----------	0.15			
	34-60	1-5	1.70-1.80	>20	0.02-0.04	7.9-8.4	Low-----------	0.10			

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
DpD2:											
Desker----------	0-9	7-15	1.40-1.70	2.0-6.0	0.12-0.15	5.6-6.5	Low----------	0.20	4	3	2-4
	9-14	12-18	1.50-1.70	2.0-6.0	0.09-0.12	5.6-7.3	Low----------	0.17			
	14-30	4-10	1.60-1.80	6.0-20	0.06-0.09	6.6-8.4	Low----------	0.15			
	30-60	1-5	1.70-1.80	>20	0.02-0.04	7.9-8.4	Low----------	0.10			
Rodman----------	0-8	5-20	1.30-1.60	2.0-6.0	0.09-0.12	6.6-7.8	Low----------	0.15	3	8	2-4
	8-12	5-25	1.40-1.60	2.0-6.0	0.09-0.12	6.6-7.8	Low----------	0.20			
	12-60	0-10	1.60-1.80	>20	0.02-0.04	7.4-8.4	Low----------	0.10			
Du:											
Drummer---------	0-17	28-35	1.20-1.60	0.6-2.0	0.21-0.23	5.6-7.3	Moderate-----	0.28	5	7	3-6
	17-54	20-35	1.40-1.60	0.6-2.0	0.21-0.24	5.6-7.8	Moderate-----	0.28			
	54-70	20-33	1.40-1.70	0.6-2.0	0.17-0.20	6.1-7.8	Moderate-----	0.28			
	70-80	15-30	1.50-1.70	0.6-2.0	0.11-0.19	7.4-8.4	Low----------	0.28			
Drummer, stratified sandy substratum-----	0-11	28-35	1.20-1.60	0.6-2.0	0.21-0.23	6.1-7.3	Moderate-----	0.28	5	7	3-6
	11-44	28-35	1.40-1.60	0.6-2.0	0.20-0.22	6.1-7.3	Moderate-----	0.28			
	44-58	15-27	1.50-1.70	0.6-2.0	0.17-0.20	6.6-7.8	Low----------	0.28			
	58-70	5-15	1.50-1.70	0.6-2.0	0.05-0.14	7.4-8.4	Low----------	0.20			
Dy--------------- Du Page	0-49	18-27	1.20-1.60	0.6-2.0	0.18-0.24	6.6-8.4	Low----------	0.28	5	6	3-5
	49-60	10-20	1.50-1.70	0.6-2.0	0.17-0.19	7.9-8.4	Low----------	0.28			
EkA-------------- Elston	0-10	7-15	1.40-1.70	2.0-6.0	0.18-0.20	5.1-7.3	Low----------	0.20	4	3	2-4
	10-25	5-18	1.50-1.70	2.0-6.0	0.10-0.14	5.1-6.5	Low----------	0.24			
	25-49	3-12	1.60-1.80	6.0-20	0.08-0.10	5.1-7.3	Low----------	0.17			
	49-60	1-5	1.60-1.80	>20	0.02-0.04	7.4-8.4	Low----------	0.10			
EmA-------------- Elston	0-14	10-18	1.30-1.60	2.0-6.0	0.20-0.22	5.1-7.3	Low----------	0.28	4	5	2-4
	14-19	10-18	1.40-1.60	2.0-6.0	0.17-0.19	5.1-6.5	Low----------	0.32			
	19-38	5-18	1.50-1.70	2.0-6.0	0.10-0.14	5.1-6.5	Low----------	0.24			
	38-58	3-12	1.60-1.80	6.0-20	0.08-0.10	5.1-7.3	Low----------	0.17			
	58-70	1-5	1.60-1.80	>20	0.02-0.04	7.4-8.4	Low----------	0.10			
FcB:											
Fincastle-------	0-8	15-27	1.30-1.60	0.6-2.0	0.22-0.24	5.1-7.3	Low----------	0.37	5	5	1-3
	8-32	23-35	1.40-1.60	0.6-2.0	0.18-0.20	4.5-6.5	Moderate-----	0.37			
	32-42	18-32	1.50-1.70	0.2-0.6	0.15-0.19	5.1-7.8	Moderate-----	0.37			
	42-60	12-18	1.70-2.00	0.06-0.2	0.05-0.19	7.4-8.4	Low----------	0.37			
Crosby----------	0-9	15-27	1.30-1.60	0.6-2.0	0.20-0.24	5.1-7.3	Low----------	0.43	3	5	1-3
	9-38	20-35	1.50-1.70	0.06-0.2	0.15-0.20	5.1-7.3	Moderate-----	0.43			
	38-60	15-27	1.70-2.00	0.06-0.2	0.05-0.17	7.4-8.4	Low----------	0.43			
Hd--------------- Harpster	0-11	22-27	1.20-1.60	0.6-2.0	0.21-0.24	7.4-8.4	Low----------	0.28	5	4L	3-6
	11-30	25-35	1.40-1.60	0.6-2.0	0.18-0.22	7.4-8.4	Moderate-----	0.28			
	30-60	15-30	1.40-1.60	0.6-2.0	0.17-0.22	7.4-8.4	Low----------	0.28			
HfB2, HfC2------- High Gap Variant	0-9	18-25	1.30-1.60	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.37	4	6	1-3
	9-28	28-35	1.50-1.70	0.6-2.0	0.15-0.19	4.5-6.0	Moderate-----	0.37			
	28-36	30-45	1.50-1.70	0.2-0.6	0.07-0.11	4.5-6.0	Moderate-----	0.37			
	36	---	---	---	---	---	-------------	----			
HnB-------------- Hononegah	0-10	3-12	1.40-1.70	6.0-20	0.04-0.06	5.6-7.8	Low----------	0.17	4	2	1-2
	10-34	6-15	1.60-1.80	6.0-20	0.03-0.05	5.6-7.8	Low----------	0.15			
	34-60	2-7	1.60-1.80	>20	0.02-0.03	7.9-8.4	Low----------	0.15			

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
HoA--------------- Hononegah	0-11	8-15	1.40-1.70	2.0-6.0	0.10-0.15	5.6-7.8	Low-----------	0.20	4	3	1-2
	11-45	6-15	1.60-1.80	6.0-20	0.03-0.05	5.6-7.8	Low-----------	0.15			
	45-60	2-7	1.60-1.80	>20	0.02-0.04	7.9-8.4	Low-----------	0.15			
Hv---------------- Houghton	0-60	---	0.15-0.45	0.2-6.0	0.35-0.45	5.6-7.8	-------------	----	5	2	>70
KaA, KaB2--------- Kalamazoo	0-11	8-25	1.30-1.60	0.6-2.0	0.16-0.22	5.1-7.3	Low-----------	0.32	4	5	1-3
	11-34	18-30	1.50-1.70	0.6-2.0	0.10-0.18	5.1-7.3	Low-----------	0.32			
	34-61	2-15	1.60-1.80	6.0-20	0.02-0.08	5.1-7.8	Low-----------	0.15			
	61-65	0-10	1.60-1.80	>20	0.01-0.04	7.4-8.4	Low-----------	0.10			
KbB2, KcB2, KcC2- Kalamazoo	0-9	10-20	1.30-1.60	0.6-2.0	0.22-0.24	5.1-7.3	Low-----------	0.37	4	5	1-3
	9-32	18-30	1.50-1.70	0.6-2.0	0.10-0.18	5.1-7.3	Low-----------	0.32			
	32-46	2-15	1.60-1.80	6.0-20	0.02-0.08	5.1-7.8	Low-----------	0.15			
	46-60	0-10	1.60-1.80	>20	0.01-0.04	7.4-8.4	Low-----------	0.10			
KoD2-------------- Kosciusko	0-5	7-18	1.40-1.70	0.6-2.0	0.13-0.15	5.1-6.5	Low-----------	0.24	4	3	1-2
	5-20	18-27	1.50-1.70	0.6-2.0	0.10-0.15	5.1-6.5	Low-----------	0.28			
	20-27	4-12	1.60-1.80	0.6-2.0	0.05-0.11	5.1-7.8	Low-----------	0.28			
	27-60	1-5	1.60-1.80	>20	0.02-0.04	7.4-8.4	Low-----------	0.10			
KpC3-------------- Kosciusko	0-8	20-25	1.40-1.70	0.6-2.0	0.16-0.18	5.1-6.5	Low-----------	0.24	3	5	.5-1
	8-27	18-27	1.50-1.70	0.6-2.0	0.10-0.15	5.1-6.5	Low-----------	0.28			
	27-60	1-5	1.60-1.80	>20	0.02-0.04	7.4-8.4	Low-----------	0.10			
LaA--------------- Lafayette	0-13	15-25	1.20-1.60	0.6-2.0	0.22-0.24	5.6-7.3	Low-----------	0.28	5	6	2-4
	13-40	25-35	1.40-1.60	0.6-2.0	0.18-0.22	5.1-6.5	Moderate-----	0.43			
	40-45	10-30	1.50-1.70	0.6-2.0	0.14-0.18	5.6-6.5	Low-----------	0.32			
	45-65	5-22	1.60-1.80	0.6-2.0	0.08-0.12	6.1-7.3	Low-----------	0.17			
	65-70	1-5	1.60-1.80	>20	0.02-0.04	7.4-8.4	Low-----------	0.10			
LeA--------------- La Hogue	0-13	15-25	1.30-1.60	0.6-2.0	0.22-0.24	6.1-7.3	Low-----------	0.28	5	6	2-4
	13-42	20-30	1.50-1.70	0.6-2.0	0.15-0.19	5.1-6.5	Low-----------	0.28			
	42-47	10-20	1.60-1.80	0.6-2.0	0.09-0.13	5.6-7.3	Low-----------	0.28			
	47-60	12-18	1.70-2.00	0.06-0.2	0.05-0.10	7.4-8.4	Low-----------	0.37			
Lm---------------- Lash	0-14	10-18	1.20-1.50	0.6-2.0	0.22-0.24	7.4-8.4	Low-----------	0.32	5	4L	2-4
	14-52	5-18	1.40-1.60	2.0-6.0	0.14-0.21	7.4-8.4	Low-----------	0.32			
	52-60	5-15	1.50-1.70	6.0-20	0.08-0.10	7.9-8.4	Low-----------	0.17			
LnA, LnB2--------- Lauramie	0-9	10-20	1.30-1.60	0.6-2.0	0.22-0.24	6.1-7.3	Low-----------	0.32	5	5	1-3
	9-15	15-32	1.40-1.60	0.6-2.0	0.18-0.22	5.1-6.5	Moderate-----	0.43			
	15-44	20-32	1.50-1.70	0.6-2.0	0.14-0.19	5.1-7.3	Moderate-----	0.32			
	44-50	10-18	1.50-1.70	0.6-2.0	0.13-0.16	6.6-7.8	Low-----------	0.28			
	50-60	8-15	1.50-1.70	0.6-2.0	0.07-0.13	7.4-8.4	Low-----------	0.28			
LoA, LoB---------- Linkville	0-15	10-20	1.30-1.60	0.6-2.0	0.20-0.22	5.1-7.3	Low-----------	0.24	5	5	2-4
	15-38	13-30	1.50-1.70	0.6-2.0	0.15-0.19	4.5-6.5	Low-----------	0.32			
	38-70	10-30	1.50-1.70	0.6-2.0	0.15-0.19	4.5-7.8	Low-----------	0.32			
	70-80	8-15	1.50-1.70	0.6-2.0	0.08-0.13	7.4-8.4	Low-----------	0.32			
LvB2, LwB2-------- Longlois	0-9	11-22	1.30-1.60	0.6-2.0	0.20-0.24	5.1-7.3	Low-----------	0.32	5	5	1-3
	9-16	27-35	1.40-1.60	0.6-2.0	0.18-0.20	6.6-7.8	Moderate-----	0.32			
	16-25	22-35	1.50-1.70	0.6-2.0	0.15-0.19	4.5-6.0	Moderate-----	0.32			
	25-54	20-32	1.50-1.70	0.6-2.0	0.04-0.16	5.1-7.8	Low-----------	0.10			
	54-60	0-5	1.60-1.80	>20	0.02-0.04	7.9-8.4	Low-----------	0.10			
Mb---------------- Mahalasville	0-13	27-35	1.20-1.60	0.6-2.0	0.21-0.23	6.1-7.3	Moderate-----	0.28	5	7	3-6
	13-33	30-35	1.40-1.60	0.6-2.0	0.18-0.20	6.1-7.3	Moderate-----	0.28			
	33-46	20-30	1.50-1.70	0.6-2.0	0.15-0.22	6.6-7.8	Low-----------	0.28			
	46-60	1-5	1.60-1.80	>20.0	0.02-0.04	7.4-8.4	Low-----------	0.10			

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
Mc---------------- Mahalasville	0-10	28-35	1.20-1.60	0.6-2.0	0.21-0.23	6.6-7.3	Moderate-----	0.28	5	7	3-6
	10-33	28-35	1.40-1.60	0.6-2.0	0.18-0.20	6.6-7.3	Moderate-----	0.43			
	33-54	20-35	1.50-1.70	0.6-2.0	0.15-0.19	6.6-7.8	Moderate-----	0.32			
	54-59	2-10	1.60-1.80	2.0-6.0	0.03-0.05	6.6-7.8	Low-----------	0.15			
	59	---	---	---	---	---	-------------	----			
Md: Mahalasville----	0-12	28-30	1.20-1.60	0.2-0.6	0.21-0.23	6.6-7.3	Low-----------	0.28	5	7	3-6
	12-38	28-35	1.40-1.60	0.6-2.0	0.18-0.20	6.6-7.3	Moderate-----	0.28			
	38-48	8-25	1.50-1.70	0.6-2.0	0.17-0.19	7.4-7.8	Low-----------	0.28			
	48-60	3-18	1.50-1.70	0.6-2.0	0.19-0.21	7.9-8.4	Low-----------	0.28			
Treaty-----------	0-10	28-35	1.20-1.60	0.6-2.0	0.22-0.24	5.6-7.3	Moderate-----	0.32	5	7	3-6
	10-37	28-35	1.40-1.60	0.6-2.0	0.18-0.20	6.1-7.8	Moderate-----	0.43			
	37-48	20-35	1.50-1.70	0.6-2.0	0.15-0.19	6.6-7.8	Moderate-----	0.43			
	48-60	12-18	1.70-1.90	0.2-0.6	0.17-0.19	7.4-8.4	Low-----------	0.43			
MmB2------------- Marker	0-8	18-27	1.30-1.60	0.6-2.0	0.22-0.24	5.1-7.3	Low-----------	0.32	4	6	1-3
	8-21	28-34	1.50-1.70	0.6-2.0	0.15-0.19	5.1-7.3	Moderate-----	0.32			
	21-26	24-27	1.50-1.70	0.6-2.0	0.15-0.20	7.4-8.4	Low-----------	0.32			
	26-60	24-27	1.70-1.90	0.06-0.2	0.05-0.10	7.4-8.4	Low-----------	0.43			
MoA--------------- Mellott	0-9	16-27	1.30-1.60	0.6-2.0	0.22-0.24	5.6-7.3	Low-----------	0.32	5	5	2-4
	9-28	25-35	1.40-1.60	0.6-2.0	0.18-0.20	4.5-6.0	Moderate-----	0.43			
	28-42	10-30	1.50-1.70	0.6-2.0	0.16-0.19	5.1-6.0	Low-----------	0.43			
	42-50	10-20	1.50-1.70	0.6-2.0	0.14-0.17	5.6-7.8	Low-----------	0.43			
	50-60	12-18	1.50-1.70	0.6-2.0	0.08-0.13	7.4-8.4	Low-----------	0.43			
MsC2, MsD2------- Miami	0-9	15-27	1.30-1.60	0.6-2.0	0.20-0.24	5.6-7.3	Low-----------	0.37	4	5	1-2
	9-27	25-35	1.50-1.70	0.6-2.0	0.15-0.20	5.1-6.0	Moderate-----	0.37			
	27-35	18-27	1.50-1.70	0.2-0.6	0.14-0.19	6.6-7.8	Low-----------	0.37			
	35-60	12-18	1.70-2.00	0.06-0.2	0.05-0.10	7.4-8.4	Low-----------	0.37			
MtC3, MtD3------- Miami	0-7	28-35	1.40-1.70	0.6-2.0	0.18-0.20	5.6-7.3	Moderate-----	0.37	3	6	.5-2
	7-23	25-35	1.50-1.70	0.6-2.0	0.15-0.20	5.1-6.0	Moderate-----	0.37			
	23-29	18-27	1.50-1.70	0.2-0.6	0.14-0.19	6.6-7.8	Low-----------	0.37			
	29-60	12-18	1.70-2.00	0.06-0.2	0.05-0.10	7.4-8.4	Low-----------	0.37			
Mu---------------- Milford	0-15	30-40	1.20-1.60	0.6-2.0	0.21-0.23	5.6-7.3	Moderate-----	0.28	5	4	3-6
	15-26	40-45	1.40-1.60	0.2-0.6	0.11-0.13	5.6-7.3	High---------	0.32			
	26-54	35-42	1.40-1.60	0.2-0.6	0.18-0.20	5.6-7.8	Moderate-----	0.43			
	54-60	20-30	1.50-1.70	0.2-0.6	0.20-0.22	7.4-8.4	Low-----------	0.43			
MwA--------------- Mulvey	0-9	10-20	1.30-1.60	0.6-2.0	0.22-0.24	5.1-7.3	Low-----------	0.32	5	5	2-4
	9-29	25-35	1.40-1.60	0.6-2.0	0.18-0.22	4.5-6.0	Moderate-----	0.43			
	29-41	20-33	1.50-1.70	0.6-2.0	0.16-0.18	4.5-6.0	Moderate-----	0.32			
	41-66	10-28	1.50-1.70	0.6-2.0	0.09-0.13	5.1-7.3	Low-----------	0.24			
	66-80	1-5	1.60-1.80	>20	0.02-0.04	7.4-8.4	Low-----------	0.10			
Mz---------------- Muskego	0-10	---	0.10-0.21	0.6-6.0	0.35-0.45	5.6-7.3	-------------	----	4	2	60-90
	10-39	---	0.10-0.21	0.6-6.0	0.35-0.45	5.6-7.3	-------------	----			
	39-60	18-35	0.30-1.10	0.06-0.2	0.18-0.24	6.6-8.4	Moderate-----	0.28			
OaB2: Oakville--------	0-8	2-14	1.40-1.70	6.0-20	0.09-0.12	4.5-7.3	Low-----------	0.17	5	2	.5-2
	8-80	0-10	1.50-1.70	6.0-20	0.06-0.10	4.5-7.3	Low-----------	0.15			
Billett----------	0-8	5-15	1.40-1.70	2.0-6.0	0.13-0.18	4.5-7.8	Low-----------	0.20	4	3	1-2
	8-22	6-18	1.50-1.70	2.0-6.0	0.10-0.17	4.5-7.3	Low-----------	0.20			
	22-80	3-10	1.50-1.70	2.0-6.0	0.07-0.14	5.1-7.3	Low-----------	0.20			

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
OgA--------------- Ockley	0-11	11-22	1.30-1.60	0.6-2.0	0.20-0.24	5.6-6.5	Low-----------	0.37	5	5	1-2
	11-42	25-35	1.40-1.60	0.6-2.0	0.15-0.22	4.5-6.0	Moderate-----	0.37			
	42-63	20-30	1.50-1.70	0.6-2.0	0.06-0.11	5.6-6.5	Low-----------	0.24			
	63-70	2-5	1.60-1.80	>20	0.02-0.04	7.4-8.4	Low-----------	0.10			
OmB2, OmC2------- Octagon	0-8	15-27	1.30-1.60	0.6-2.0	0.20-0.24	5.6-7.3	Low-----------	0.28	4	6	2-4
	8-37	18-30	1.50-1.70	0.6-2.0	0.15-0.19	5.6-7.3	Low-----------	0.28			
	37-60	12-18	1.70-2.00	0.06-0.2	0.05-0.10	7.4-8.4	Low-----------	0.37			
OpC3-------------- Octagon	0-8	28-30	1.40-1.70	0.6-2.0	0.15-0.19	5.6-7.3	Low-----------	0.28	3	6	1-2
	8-22	18-30	1.50-1.70	0.6-2.0	0.15-0.19	5.6-7.3	Low-----------	0.28			
	22-28	12-20	1.50-1.70	0.6-2.0	0.15-0.19	6.6-7.8	Low-----------	0.28			
	28-60	12-18	1.70-2.00	0.06-0.2	0.05-0.10	7.4-8.4	Low-----------	0.37			
Ou---------------- Ouiatenon	0-6	5-18	1.40-1.70	2.0-6.0	0.13-0.15	7.4-8.4	Low-----------	0.20	3	3	2-4
	6-18	0-10	1.50-1.70	6.0-20	0.06-0.11	7.4-8.4	Low-----------	0.15			
	18-36	0-5	1.50-1.70	6.0-20	0.06-0.11	7.4-8.4	Low-----------	0.15			
	36-60	0-5	1.60-1.80	>20	0.02-0.04	7.4-8.4	Low-----------	0.10			
Ox---------------- Ouiatenon	0-16	2-10	1.40-1.70	2.0-6.0	0.10-0.12	7.4-8.4	Low-----------	0.17	3	2	1-3
	16-20	0-10	1.50-1.70	6.0-20	0.06-0.11	7.4-8.4	Low-----------	0.15			
	20-48	0-5	1.50-1.70	6.0-20	0.06-0.11	7.4-8.4	Low-----------	0.15			
	48-60	0-5	1.60-1.80	>20	0.02-0.04	7.4-8.4	Low-----------	0.10			
Oy---------------- Ouiatenon	0-13	8-18	1.40-1.70	2.0-6.0	0.16-0.18	7.4-8.4	Low-----------	0.20	3	3	2-4
	13-21	2-10	1.50-1.70	6.0-20.0	0.09-0.11	7.4-8.4	Low-----------	0.17			
	21-60	1-10	1.60-1.80	6.0-20.0	0.06-0.10	7.4-8.4	Low-----------	0.15			
Pc---------------- Palms	0-36	---	0.25-0.45	0.6-6.0	0.35-0.45	5.1-7.8	-------------	----	5	2	>75
	36-60	7-35	1.45-1.75	0.6-2.0	0.14-0.22	6.1-8.4	Low-----------	0.37			
Pd---------------- Palms	0-42	---	0.25-0.45	2.0-6.0	0.35-0.45	5.1-7.8	-------------	----	5	2	>75
	42-60	0-8	1.70-1.90	>20	0.02-0.04	7.4-8.4	Low-----------	0.10			
Pg---------------- Pella	0-15	28-35	1.20-1.60	0.6-2.0	0.21-0.23	6.1-7.8	Moderate-----	0.28	5	7	4-6
	15-23	28-35	1.40-1.60	0.6-2.0	0.21-0.24	6.6-7.8	Moderate-----	0.28			
	23-31	15-27	1.40-1.60	0.6-2.0	0.15-0.20	7.4-8.4	Low-----------	0.28			
	31-60	15-30	1.50-1.70	0.6-2.0	0.10-0.22	7.4-8.4	Low-----------	0.28			
Pk---------------- Peotone	0-19	28-40	1.20-1.60	0.2-0.6	0.21-0.23	5.6-7.3	Moderate-----	0.28	5	4	4-7
	19-50	35-45	1.40-1.70	0.06-0.2	0.11-0.20	6.1-7.8	Moderate-----	0.28			
	50-60	25-40	1.40-1.60	0.2-0.6	0.15-0.22	6.6-8.4	Moderate-----	0.43			
PmB--------------- Pinevillage	0-8	7-18	1.40-1.70	2.0-6.0	0.11-0.13	7.4-8.4	Low-----------	0.17	5	3	1-2
	8-45	7-18	1.50-1.70	2.0-6.0	0.07-0.15	7.4-8.4	Low-----------	0.17			
	45-60	7-18	1.60-1.80	2.0-6.0	0.02-0.05	7.4-8.4	Low-----------	0.17			
Pt. Pits											
RaB2-------------- Rainsville	0-9	13-25	1.30-1.60	0.6-2.0	0.22-0.24	5.6-7.3	Low-----------	0.37	5	5	1-3
	9-14	25-35	1.40-1.60	0.6-2.0	0.18-0.20	5.6-7.3	Moderate-----	0.37			
	14-37	20-30	1.50-1.70	0.6-2.0	0.17-0.19	4.5-6.0	Low-----------	0.37			
	37-41	15-30	1.50-1.70	0.6-2.0	0.14-0.18	4.5-6.0	Low-----------	0.37			
	41-54	18-25	1.50-1.70	0.2-0.6	0.17-0.19	6.6-7.8	Low-----------	0.37			
	54-60	12-18	1.70-2.00	0.06-0.2	0.05-0.10	7.4-8.4	Low-----------	0.37			

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
RcA:											
Raub------------	0-11	20-27	1.30-1.60	0.6-2.0	0.22-0.24	5.6-7.3	Low-----------	0.28	5	6	2-4
	11-34	25-35	1.40-1.60	0.6-2.0	0.18-0.20	5.1-6.5	Moderate-----	0.37			
	34-53	20-32	1.50-1.70	0.2-0.6	0.15-0.19	6.1-7.3	Moderate-----	0.37			
	53-60	12-18	1.70-2.00	0.06-0.2	0.05-0.19	7.4-8.4	Low-----------	0.37			
Brenton---------	0-11	20-27	1.30-1.60	0.6-2.0	0.22-0.24	5.6-7.8	Low-----------	0.28	5	6	2-4
	11-38	25-35	1.40-1.60	0.6-2.0	0.18-0.20	5.6-7.3	Moderate-----	0.28			
	38-52	18-27	1.50-1.70	0.6-2.0	0.15-0.19	5.6-7.8	Low-----------	0.28			
	52-60	5-20	1.50-1.70	0.6-2.0	0.11-0.20	5.6-8.4	Low-----------	0.28			
RdA, RdB2, RdC2-- Richardville	0-7	10-20	1.30-1.60	0.6-2.0	0.22-0.24	5.1-7.3	Low-----------	0.37	5	5	1-2
	7-13	28-34	1.40-1.60	0.6-2.0	0.18-0.20	5.6-6.5	Moderate-----	0.37			
	13-41	25-34	1.50-1.70	0.6-2.0	0.13-0.19	4.5-6.0	Moderate-----	0.37			
	41-51	18-30	1.50-1.70	0.6-2.0	0.13-0.19	6.1-7.3	Low-----------	0.37			
	51-60	6-15	1.50-1.70	0.6-2.0	0.08-0.13	7.4-8.4	Low-----------	0.28			
RoB-------------- Rockfield	0-10	12-24	1.30-1.60	0.6-2.0	0.22-0.24	4.5-7.3	Low-----------	0.37	5	5	1-2
	10-25	25-35	1.40-1.60	0.6-2.0	0.18-0.20	4.5-6.0	Moderate-----	0.37			
	25-46	20-32	1.50-1.70	0.6-2.0	0.15-0.19	5.1-7.3	Moderate-----	0.37			
	46-67	18-27	1.50-1.70	0.2-0.6	0.17-0.19	6.6-7.8	Low-----------	0.37			
	67-80	12-18	1.70-2.00	0.06-0.2	0.05-0.10	7.4-8.4	Low-----------	0.37			
RsF-------------- Rodman	0-10	8-25	1.30-1.60	2.0-6.0	0.10-0.12	6.6-7.8	Low-----------	0.20	3	8	2-4
	10-15	5-25	1.50-1.70	2.0-6.0	0.09-0.12	6.6-7.8	Low-----------	0.20			
	15-60	0-10	1.60-1.80	>20	0.02-0.04	7.4-8.4	Low-----------	0.10			
Rz--------------- Ross	0-17	15-27	1.20-1.50	0.6-2.0	0.19-0.24	6.1-7.8	Low-----------	0.32	5	5	3-5
	17-39	18-32	1.30-1.50	0.6-2.0	0.16-0.22	6.1-8.4	Moderate-----	0.32			
	39-60	5-20	1.50-1.70	0.6-2.0	0.05-0.18	6.1-8.4	Low-----------	0.32			
Sd--------------- Saranac	0-18	40-45	1.20-1.60	0.2-0.6	0.12-0.14	6.1-7.8	Moderate-----	0.28	5	4	3-6
	18-58	20-45	1.40-1.60	0.2-0.6	0.11-0.20	6.6-7.3	Moderate-----	0.43			
	58-70	3-10	1.60-1.80	6.0-20	0.02-0.11	7.4-7.8	Low-----------	0.10			
Sf--------------- Sawabash	0-9	28-34	1.20-1.60	0.6-2.0	0.21-0.23	7.4-8.4	Moderate-----	0.28	5	4L	4-8
	9-46	28-34	1.40-1.60	0.6-2.0	0.18-0.20	7.4-8.4	Moderate-----	0.28			
	46-55	28-34	1.40-1.60	0.6-2.0	0.18-0.20	7.4-8.4	Moderate-----	0.43			
	55-60	28-34	1.40-1.60	0.6-2.0	0.18-0.20	7.4-8.4	Moderate-----	0.43			
ShB-------------- Shadeland	0-8	18-27	1.30-1.60	0.6-2.0	0.22-0.24	5.1-6.5	Low-----------	0.37	4	6	1-2
	8-16	25-35	1.40-1.60	0.6-2.0	0.18-0.22	5.1-6.0	Moderate-----	0.43			
	16-27	28-35	1.50-1.70	0.6-2.0	0.15-0.19	4.5-6.0	Moderate-----	0.32			
	27-34	28-35	1.50-1.70	0.2-0.6	0.10-0.17	5.1-6.0	Moderate-----	0.32			
	34	---	---	---	---	---	-------------	----			
SmA-------------- Sleeth	0-10	11-22	1.30-1.60	0.6-2.0	0.20-0.24	6.6-7.3	Low-----------	0.32	5	5	.5-3
	10-47	20-35	1.50-1.70	0.6-2.0	0.15-0.19	5.6-6.5	Moderate-----	0.32			
	47-58	18-35	1.50-1.70	0.6-2.0	0.14-0.16	6.6-8.4	Moderate-----	0.32			
	58-70	2-5	1.60-1.80	>20	0.02-0.04	7.9-8.4	Low-----------	0.10			
Sn--------------- Sloan	0-16	28-33	1.30-1.60	0.6-2.0	0.16-0.19	6.1-7.8	Moderate-----	0.24	5	6	3-6
	16-32	22-35	1.50-1.70	0.6-2.0	0.15-0.19	6.1-8.4	Moderate-----	0.37			
	32-60	10-30	1.50-1.70	0.6-2.0	0.13-0.18	6.6-8.4	Low-----------	0.37			
So--------------- Sloan Variant	0-10	28-34	1.20-1.60	0.6-2.0	0.21-0.23	7.4-8.4	Moderate-----	0.28	3	7	3-6
	10-17	28-34	1.40-1.60	0.6-2.0	0.18-0.20	7.4-8.4	Moderate-----	0.28			
	17-33	20-30	1.50-1.70	0.6-2.0	0.06-0.11	7.4-8.4	Low-----------	0.28			
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TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
SrB, SrC---------Sparta	0-19	1-5	1.40-1.70	6.0-20	0.06-0.09	5.1-7.3	Low----------	0.17	5	1	.5-2
	19-48	1-8	1.50-1.70	6.0-20	0.05-0.11	5.1-7.3	Low----------	0.17			
	48-80	0-5	1.50-1.70	6.0-20	0.04-0.07	5.1-7.8	Low----------	0.17			
StC--------------Spinks	0-9	0-10	1.40-1.70	6.0-20	0.06-0.08	5.1-7.3	Low----------	0.15	5	1	.5-1
	9-21	0-15	1.50-1.70	6.0-20	0.05-0.10	5.6-7.3	Low----------	0.17			
	21-68	3-15	1.50-1.70	2.0-6.0	0.04-0.08	5.6-7.8	Low----------	0.17			
	68-80	0-10	1.50-1.70	6.0-20	0.04-0.06	6.6-8.4	Low----------	0.17			
SwA:											
Starks----------	0-10	18-27	1.30-1.60	0.6-2.0	0.22-0.24	5.1-7.3	Low----------	0.37	5	6	1-3
	10-38	28-35	1.40-1.60	0.6-2.0	0.18-0.20	5.1-6.5	Moderate-----	0.37			
	38-56	18-27	1.50-1.70	0.6-2.0	0.16-0.19	5.1-7.8	Low----------	0.37			
	56-70	5-20	1.50-1.70	0.6-2.0	0.08-0.18	5.1-7.8	Low----------	0.37			
Fincastle-------	0-10	15-27	1.30-1.60	0.6-2.0	0.22-0.24	5.1-7.3	Low----------	0.37	5	5	1-3
	10-39	25-35	1.40-1.60	0.6-2.0	0.18-0.20	4.5-6.5	Moderate-----	0.37			
	39-54	18-32	1.50-1.70	0.2-0.6	0.15-0.19	5.1-7.8	Moderate-----	0.37			
	54-60	12-18	1.70-2.00	0.06-0.2	0.05-0.19	7.4-8.4	Low----------	0.37			
SyF:											
Strawn----------	0-9	18-27	1.30-1.60	0.6-2.0	0.20-0.24	6.1-7.3	Low----------	0.37	5	6	1-3
	9-16	18-35	1.50-1.70	0.6-2.0	0.15-0.20	5.6-7.8	Moderate-----	0.37			
	16-60	12-18	1.70-2.00	0.2-0.6	0.08-0.12	7.4-8.4	Low----------	0.37			
Rodman----------	0-5	5-20	1.40-1.70	2.0-6.0	0.09-0.12	6.6-7.8	Low----------	0.15	3	8	2-4
	5-15	5-25	1.50-1.70	2.0-6.0	0.09-0.12	6.6-7.8	Low----------	0.20			
	15-60	0-10	1.60-1.80	>20	0.02-0.04	7.4-8.4	Low----------	0.10			
TbA--------------Tecumseh	0-15	15-27	1.30-1.60	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.32	5	5	2-4
	15-30	28-34	1.40-1.60	0.6-2.0	0.18-0.20	4.5-6.5	Moderate-----	0.43			
	30-48	15-30	1.50-1.70	0.6-2.0	0.15-0.19	5.1-6.5	Low----------	0.32			
	48-65	15-25	1.50-1.70	0.6-2.0	0.17-0.19	6.1-7.3	Low----------	0.32			
	65-75	15-20	1.50-1.70	0.6-2.0	0.16-0.18	7.4-8.4	Low----------	0.32			
	75-80	8-18	1.55-1.70	0.6-2.0	0.08-0.13	7.4-8.4	Low----------	0.37			
TcA--------------Thackery	0-10	15-27	1.30-1.60	0.6-2.0	0.20-0.24	5.6-7.3	Low----------	0.37	4	5	1-3
	10-16	25-35	1.40-1.60	0.6-2.0	0.17-0.22	5.1-6.5	Moderate-----	0.37			
	16-48	20-35	1.50-1.70	0.6-2.0	0.13-0.18	5.1-7.8	Moderate-----	0.37			
	48-54	15-27	1.50-1.70	2.0-6.0	0.04-0.10	6.1-7.8	Low----------	0.10			
	54-60	1-5	1.60-1.80	>20	0.02-0.04	7.4-7.8	Low----------	0.10			
TfB--------------Throckmorton	0-9	15-27	1.30-1.60	0.6-2.0	0.22-0.24	5.1-7.3	Low----------	0.32	5	5	1-3
	9-34	25-34	1.40-1.60	0.6-2.0	0.18-0.22	4.5-6.5	Moderate-----	0.43			
	34-45	15-30	1.50-1.70	0.6-2.0	0.11-0.22	4.5-6.0	Low----------	0.32			
	45-58	15-25	1.50-1.70	0.2-0.6	0.15-0.19	6.1-7.3	Low----------	0.32			
	58-60	12-18	1.70-2.00	0.06-0.2	0.05-0.10	7.4-8.4	Low----------	0.37			
Tg---------------Tice	0-14	28-35	1.20-1.60	0.6-2.0	0.21-0.24	6.1-7.8	Moderate-----	0.32	5	7	2-3
	14-50	27-40	1.40-1.60	0.6-2.0	0.18-0.20	5.6-7.8	Moderate-----	0.32			
	50-60	15-30	1.40-1.60	0.6-2.0	0.11-0.18	5.6-7.8	Low----------	0.32			
TmA:											
Toronto---------	0-9	15-27	1.30-1.60	0.6-2.0	0.22-0.24	5.1-6.5	Low----------	0.32	5	5	2-4
	9-27	25-40	1.40-1.60	0.6-2.0	0.18-0.20	4.5-6.0	Moderate-----	0.32			
	27-52	15-40	1.50-1.70	0.2-0.6	0.15-0.19	5.6-7.8	Moderate-----	0.32			
	52-60	12-18	1.70-2.00	0.06-0.2	0.05-0.19	7.9-8.4	Low----------	0.32			
Millbrook-------	0-9	15-27	1.30-1.60	0.6-2.0	0.22-0.24	5.1-7.8	Low----------	0.32	5	6	2-4
	9-37	25-35	1.40-1.60	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-----	0.43			
	37-49	18-35	1.50-1.70	0.6-2.0	0.12-0.19	5.1-7.3	Moderate-----	0.32			
	49-60	5-20	1.50-1.70	0.6-2.0	0.11-0.19	5.6-8.4	Low----------	0.32			

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodi-bility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
TnB2:											
Toronto----------	0-9	15-27	1.30-1.60	0.6-2.0	0.22-0.24	5.1-6.5	Low-----------	0.32	5	5	3-5
	9-25	28-40	1.40-1.60	0.6-2.0	0.18-0.20	4.5-6.0	Moderate------	0.32			
	25-42	15-40	1.50-1.70	0.2-0.6	0.15-0.19	5.6-7.8	Moderate------	0.32			
	42-60	12-18	1.70-2.00	0.06-0.2	0.05-0.19	7.9-8.4	Low-----------	0.32			
Octagon----------	0-8	15-27	1.30-1.60	0.6-2.0	0.20-0.24	5.6-7.3	Low-----------	0.28	4	6	2-4
	8-37	18-30	1.50-1.70	0.6-2.0	0.15-0.19	5.6-7.3	Low-----------	0.28			
	37-60	12-18	1.70-2.00	0.06-0.2	0.05-0.10	7.4-8.4	Low-----------	0.37			
TtA---------------	0-12	27-35	1.20-1.60	0.6-2.0	0.21-0.23	5.6-6.5	Moderate------	0.28	5	4	3-8
Troxel	12-42	20-35	1.40-1.60	0.6-2.0	0.20-0.22	5.6-6.5	Moderate------	0.28			
	42-71	12-27	1.50-1.70	0.6-2.0	0.15-0.20	5.6-6.5	Low-----------	0.28			
	71-80	2-10	1.60-1.80	0.6-2.0	0.09-0.19	6.6-7.8	Low-----------	0.28			
Ua.											
Udorthents											
UbB:											
Urban land.											
Billett----------	0-8	8-15	1.40-1.70	2.0-6.0	0.20-0.22	4.5-7.3	Low-----------	0.28	4	5	1-3
	8-20	10-20	1.50-1.70	2.0-6.0	0.12-0.19	5.1-7.3	Low-----------	0.32			
	20-30	10-18	1.50-1.70	2.0-6.0	0.11-0.16	5.1-7.3	Low-----------	0.24			
	30-43	5-15	1.60-1.80	6.0-20	0.08-0.10	5.6-7.3	Low-----------	0.17			
	43-60	1-5	1.60-1.80	>20	0.02-0.04	7.4-8.4	Low-----------	0.10			
UcA:											
Urban land.											
Carmi------------	0-19	10-20	1.30-1.60	2.0-6.0	0.13-0.20	5.1-7.8	Low-----------	0.28	4	5	2-4
	19-43	5-22	1.40-1.70	2.0-6.0	0.12-0.19	4.5-7.8	Low-----------	0.20			
	43-60	1-5	1.60-1.80	>20	0.02-0.04	7.9-8.4	Low-----------	0.15			
UmB, UmC:											
Urban land.											
Miami------------	0-10	15-27	1.30-1.60	0.6-2.0	0.20-0.24	5.6-7.3	Low-----------	0.37	4	5	1-2
	10-23	25-35	1.50-1.70	0.6-2.0	0.15-0.20	5.1-6.0	Moderate------	0.37			
	23-36	18-27	1.50-1.70	0.2-0.6	0.14-0.19	6.6-7.8	Low-----------	0.37			
	36-60	12-18	1.70-2.00	0.06-0.2	0.05-0.10	7.4-8.4	Low-----------	0.37			
UsA:											
Urban land.											
Starks-----------	0-9	18-27	1.30-1.60	0.6-2.0	0.22-0.24	5.1-7.3	Low-----------	0.37	5	6	1-3
	9-32	28-35	1.40-1.60	0.6-2.0	0.18-0.20	5.1-6.5	Moderate------	0.37			
	32-57	18-30	1.50-1.70	0.6-2.0	0.16-0.19	5.1-7.8	Low-----------	0.37			
	57-70	5-20	1.50-1.70	0.6-2.0	0.08-0.18	5.1-7.8	Low-----------	0.37			
Fincastle--------	0-11	15-27	1.30-1.60	0.6-2.0	0.22-0.24	5.1-7.3	Low-----------	0.37	5	5	1-3
	11-38	25-35	1.40-1.60	0.6-2.0	0.18-0.20	4.5-6.5	Moderate------	0.37			
	38-46	18-32	1.50-1.70	0.2-0.6	0.15-0.19	5.1-7.8	Moderate------	0.37			
	46-60	12-18	1.70-2.00	0.06-0.2	0.05-0.19	7.4-8.4	Low-----------	0.37			
Wb---------------	0-10	20-27	1.20-1.60	0.6-2.0	0.22-0.24	7.4-8.4	Low-----------	0.32	5	5	1-6
Wallkill	10-27	15-27	1.40-1.60	0.2-0.6	0.18-0.20	6.1-7.3	Low-----------	0.37			
	27-54	---	0.10-0.30	0.2-6.0	0.35-0.45	5.6-7.3	--------------	----			
	54-60	18-35	0.30-1.10	0.06-0.2	0.18-0.24	5.1-7.3	Moderate------	0.28			

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
We---------------- Washtenaw	0-10	15-27	1.30-1.60	0.6-2.0	0.22-0.24	6.1-7.3	Low-----------	0.37	5	6	2-6
	10-23	15-27	1.30-1.60	0.6-2.0	0.20-0.22	6.1-7.3	Low-----------	0.37			
	23-50	28-35	1.40-1.60	0.06-0.2	0.15-0.20	6.1-7.3	Moderate-----	0.37			
	50-70	15-25	1.70-1.90	0.06-0.2	0.05-0.19	7.4-8.4	Low-----------	0.37			
WgA--------------- Waupecan	0-11	15-27	1.20-1.60	0.6-2.0	0.22-0.24	6.1-7.8	Low-----------	0.32	5	6	2-4
	11-35	25-35	1.40-1.60	0.6-2.0	0.18-0.22	5.6-7.3	Moderate-----	0.43			
	35-61	10-30	1.50-1.70	2.0-6.0	0.08-0.18	5.6-7.3	Low-----------	0.10			
	61-70	1-5	1.60-1.80	>20	0.02-0.04	6.6-8.4	Low-----------	0.10			
WhA--------------- Waupecan	0-15	15-27	1.20-1.60	0.6-2.0	0.22-0.24	6.1-7.8	Low-----------	0.32	5	6	2-4
	15-36	25-35	1.40-1.60	0.6-2.0	0.18-0.22	5.6-7.3	Moderate-----	0.43			
	36-58	10-30	1.50-1.60	2.0-6.0	0.08-0.18	5.6-7.3	Low-----------	0.10			
	58-65	1-5	1.60-1.80	>20	0.02-0.04	6.6-8.4	Low-----------	0.10			
WmA--------------- Waynetown	0-10	15-27	1.30-1.60	0.6-2.0	0.22-0.24	5.1-7.3	Low-----------	0.37	5	5	1-2
	10-26	28-34	1.40-1.60	0.6-2.0	0.18-0.22	5.6-6.5	Moderate-----	0.37			
	26-32	20-30	1.50-1.70	0.6-2.0	0.13-0.17	5.6-6.5	Low-----------	0.37			
	32-53	18-30	1.50-1.70	0.6-2.0	0.06-0.13	6.6-7.8	Low-----------	0.28			
	53-60	1-5	1.60-1.80	>20	0.02-0.04	7.9-8.4	Low-----------	0.10			
WtA--------------- Wea	0-10	15-27	1.20-1.60	0.6-2.0	0.22-0.24	6.1-7.3	Low-----------	0.28	5	5	2-4
	10-25	18-27	1.40-1.60	0.6-2.0	0.17-0.22	6.1-7.3	Low-----------	0.28			
	25-31	20-30	1.50-1.70	0.6-2.0	0.15-0.19	6.1-7.3	Low-----------	0.28			
	31-64	15-30	1.50-1.70	0.6-2.0	0.11-0.17	6.1-7.3	Low-----------	0.28			
	64-70	1-5	1.60-1.80	>20	0.02-0.04	7.4-8.4	Low-----------	0.17			
WuA--------------- Whitaker	0-10	15-27	1.30-1.60	0.6-2.0	0.20-0.24	5.6-7.3	Low-----------	0.37	5	5	1-3
	10-17	20-27	1.40-1.60	0.6-2.0	0.18-0.20	5.6-7.3	Low-----------	0.37			
	17-50	20-34	1.50-1.70	0.6-2.0	0.15-0.19	5.1-7.8	Moderate-----	0.37			
	50-58	3-15	1.50-1.70	0.6-2.0	0.10-0.20	6.6-8.4	Low-----------	0.37			
	58-70	12-18	1.70-2.00	0.06-0.2	0.05-0.10	7.4-8.4	Low-----------	0.37			

TABLE 19.--WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
Am-----Allison	B	Rare-----	---	---	>6.0	---	---
Ap-----Allison	B	Frequent-----	Very brief to long.	Jan-May	>6.0	---	---
AtB2:							
Alvin-----	B	None-----	---	---	>6.0	---	---
Spinks-----	A	None-----	---	---	>6.0	---	---
Ba-----Battleground	B	Rare-----	---	---	>6.0	---	---
Bb-----Battleground	B	Frequent-----	Brief or long	Nov-Jun	>6.0	---	---
BgA-----Beecher	C	None-----	---	---	1.0-3.0	Perched	Dec-Jun
BkF-----Berks	C	None-----	---	---	>6.0	---	---
BlA, BlB2-----Billett	B	None-----	---	---	>6.0	---	---
BmA-----Billett	B	None-----	---	---	3.0-6.0	Apparent	Nov-Apr
BnA, BnB2-----Billett	B	None-----	---	---	>6.0	---	---
BoA-----Bowes	B	None-----	---	---	>6.0	---	---
BpA-----Bowes Variant	B	None-----	---	---	2.0-6.0	Apparent	Dec-May
CaA-----Camden	B	None-----	---	---	>6.0	---	---
CfB, CgA-----Carmi	B	None-----	---	---	>6.0	---	---
Ck-----Ceresco	B	Rare-----	---	---	1.0-2.0	Apparent	Sep-May
Cl-----Ceresco	B	Occasional-----	Brief-----	Jan-May	1.0-2.0	Apparent	Sep-May
Cm-----Chalmers	B/D	None-----	---	---	+.5-1.0	Apparent	Dec-May
Co-----Cohoctah	B/D	Rare-----	---	---	+.5-1.0	Apparent	Sep-May

TABLE 19.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
Cp------------------------ Cohoctah	B/D	Occasional------	Brief---------	Jan-Dec	+.5-1.0	Apparent	Sep-May
CrC---------------------- Coloma	A	None------------	---	---	>6.0	---	---
CtA---------------------- Crosby	C	None------------	---	---	1.0-3.0	Perched	Jan-Apr
CwB2:							
Crosby------------------	C	None------------	---	---	1.0-3.0	Perched	Jan-Apr
Miami-------------------	B	None------------	---	---	>6.0	---	---
DmC2, DoC2-------------- Desker	A	None------------	---	---	>6.0	---	---
DpD2:							
Desker------------------	A	None------------	---	---	>6.0	---	---
Rodman------------------	A	None------------	---	---	>6.0	---	---
Du----------------------- Drummer	B/D	None------------	---	---	+.5-2.0	Apparent	Mar-Jun
Dy----------------------- Du Page	B	Frequent--------	Very brief to long.	Jan-Jun	>6.0	---	---
EkA, EmA---------------- Elston	B	None------------	---	---	>6.0	---	---
FcB:							
Fincastle---------------	C	None------------	---	---	1.0-3.0	Apparent	Jan-Apr
Crosby------------------	C	None------------	---	---	1.0-3.0	Perched	Jan-Apr
Hd----------------------- Harpster	B/D	None------------	---	---	+.5-2.0	Apparent	Feb-Jun
HfB2, HfC2-------------- High Gap Variant	B	None------------	---	---	2.0-3.5	Perched	Jan-May
HnB, HoA---------------- Hononegah	A	None------------	---	---	>6.0	---	---
Hv----------------------- Houghton	A/D	None------------	---	---	+1-1.0	Apparent	Sep-Jun
KaA, KaB2, KbB2, KcB2, KcC2------------------ Kalamazoo	B	None------------	---	---	>6.0	---	---
KoD2, KpC3-------------- Kosciusko	B	None------------	---	---	>6.0	---	---
LaA---------------------- Lafayette	B	None------------	---	---	1.0-3.0	Apparent	Jan-May
LeA---------------------- La Hogue	B	None------------	---	---	1.0-3.0	Apparent	Jan-May

TABLE 19.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
Lm: Lash	B	Frequent	Brief or long	Nov-Apr	>6.0	---	---
LnA, LnB2: Lauramie	B	None	---	---	>6.0	---	---
LoA, LoB: Linkville	B	None	---	---	>6.0	---	---
LvB2, LwB2: Longlois	B	None	---	---	>6.0	---	---
Mb: Mahalasville	B/D	None	---	---	+.5-1.0	Apparent	Dec-May
Mc: Mahalasville	B/D	None	---	---	+.5-1.0	Perched	Dec-May
Md:							
Mahalasville	B/D	None	---	---	+.5-1.0	Apparent	Dec-May
Treaty	B/D	None	---	---	+.5-1.0	Apparent	Dec-May
MmB2: Marker	B	None	---	---	1.5-3.0	Apparent	Dec-May
MoA: Mellott	B	None	---	---	>6.0	---	---
MsC2, MsD2, MtC3, MtD3: Miami	B	None	---	---	>6.0	---	---
Mu: Milford	B/D	None	---	---	+2-1.0	Apparent	Dec-Jun
MwA: Mulvey	B	None	---	---	1.0-3.0	Apparent	Dec-May
Mz: Muskego	A/D	None	---	---	+1-1.0	Apparent	Nov-Aug
OaB2:							
Oakville	A	None	---	---	>6.0	---	---
Billett	B	None	---	---	3.0-6.0	Apparent	Nov-Apr
OgA: Ockley	B	None	---	---	>6.0	---	---
OmB2, OmC2, OpC3: Octagon	B	None	---	---	>6.0	---	---
Ou: Ouiatenon	A	Frequent	Brief	Nov-May	>6.0	---	---
Ox: Ouiatenon	A	Occasional	Brief	Nov-May	>6.0	---	---
Oy: Ouiatenon	A	Frequent	Brief or long	Nov-Jun	>6.0	---	---
Pc: Palms	A/D	None	---	---	+1-1.0	Apparent	Nov-May

TABLE 19.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
Pd----------------------- Palms	A/D	None------------	---	---	+1-1.0	Apparent	Nov-Jun
Pg----------------------- Pella	B/D	None------------	---	---	+.5-2.0	Apparent	Dec-Jun
Pk----------------------- Peotone	C/D	None------------	---	---	+2-1.0	Apparent	Nov-Jun
PmB---------------------- Pinevillage	B	Rare------------	---	---	>6.0	---	---
Pt. Pits							
RaB2--------------------- Rainsville	B	None------------	---	---	2.5-4.0	Apparent	Dec-May
RcA:							
Raub--------------------	C	None------------	---	---	1.0-3.0	Apparent	Jan-Apr
Brenton-----------------	B	None------------	---	---	1.0-3.0	Apparent	Jan-Apr
RdA, RdB2, RdC2---------- Richardville	B	None------------	---	---	>6.0	---	---
RoB---------------------- Rockfield	B	None------------	---	---	2.5-4.0	Apparent	Dec-Apr
RsF---------------------- Rodman	A	None------------	---	---	>6.0	---	---
Rz----------------------- Ross	B	Rare------------	---	---	>6.0	---	---
Sd----------------------- Saranac	C	Occasional------	Brief---------	Dec-May	+.5-1.0	Apparent	Dec-Jun
Sf----------------------- Sawabash	B/D	Frequent--------	Brief or long	Nov-Jun	+.5-1.0	Apparent	Nov-Jun
ShB---------------------- Shadeland	C	None------------	---	---	1.0-2.0	Perched	Dec-May
SmA---------------------- Sleeth	C	None------------	---	---	1.0-3.0	Apparent	Jan-Apr
Sn----------------------- Sloan	B/D	Occasional------	Brief---------	Nov-Jun	+.5-1.0	Apparent	Nov-Jun
So----------------------- Sloan Variant	B	Occasional------	Brief or long	Nov-Jun	+.5-1.0	Perched	Nov-Jun
SrB, SrC----------------- Sparta	A	None------------	---	---	>6.0	---	---
StC---------------------- Spinks	A	None------------	---	---	>6.0	---	---
SwA:							
Starks------------------	C	None------------	---	---	1.0-3.0	Apparent	Jan-Apr
Fincastle---------------	C	None------------	---	---	1.0-3.0	Apparent	Jan-Apr

TABLE 19.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
SyF:							
Strawn	B	None	---	---	>6.0	---	---
Rodman	A	None	---	---	>6.0	---	---
TbA	B	None	---	---	>6.0	---	---
Tecumseh							
TcA	B	None	---	---	2.0-3.5	Apparent	Jan-Apr
Thackery							
TfB	B	None	---	---	2.5-4.0	Apparent	Dec-May
Throckmorton							
Tg	B	Frequent	Very brief to long.	Jan-Jun	1.5-3.0	Apparent	Mar-Jun
Tice							
TmA:							
Toronto	C	None	---	---	1.0-3.0	Apparent	Jan-Apr
Millbrook	B	None	---	---	1.0-3.0	Apparent	Jan-Apr
TnB2:							
Toronto	C	None	---	---	1.0-3.0	Apparent	Jan-Apr
Octagon	B	None	---	---	>6.0	---	---
TtA	B	None	---	---	>6.0	---	---
Troxel							
Ua.							
Udorthents							
UbB:							
Urban land.							
Billett	B	None	---	---	>6.0	---	---
UcA:							
Urban land.							
Carmi	B	None	---	---	>6.0	---	---
UmB, UmC:							
Urban land.							
Miami	B	None	---	---	>6.0	---	---
UsA:							
Urban land.							
Starks	C	None	---	---	1.0-3.0	Apparent	Jan-Apr
Fincastle	C	None	---	---	1.0-3.0	Apparent	Jan-Apr
Wb	C/D	None	---	---	+1-1.0	Apparent	Sep-Jun
Wallkill							
We	C/D	None	---	---	+.5-1.0	Apparent	Dec-May
Washtenaw							
WgA	B	None	---	---	>6.0	---	---
Waupecan							

TABLE 19.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months
					Ft		
WhA: Waupecan	B	None	---	---	3.0-6.0	Apparent	Mar-May
WmA: Waynetown	C	None	---	---	1.0-3.0	Apparent	Dec-May
WtA: Wea	B	Occasional	Brief or long	Nov-Jun	>6.0	---	---
WuA: Whitaker	C	None	---	---	1.0-3.0	Apparent	Dec-May

TABLE 20.--SOIL FEATURES

(The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
Am Allison	>60	---	---	---	High	High	Low.
Ap Allison	>60	---	---	---	High	High	Low.
AtB2:							
Alvin	>60	---	---	---	Moderate	Low	High.
Spinks	>60	---	---	---	Low	Low	Low.
Ba Battleground	>60	---	---	---	High	Low	Low.
Bb Battleground	>60	---	---	---	High	Low	Low.
BgA Beecher	>60	---	---	---	High	High	High.
BkF Berks	20-40	Soft	---	---	Low	Low	High.
BlA, BlB2, BmA, BnA, BnB2 Billett	>60	---	---	---	Moderate	Low	Moderate.
BoA Bowes	>60	---	---	---	High	Moderate	Moderate.
BpA Bowes Variant	>60	---	---	---	High	Moderate	Moderate.
CaA Camden	>60	---	---	---	High	Low	Moderate.
CfB, CgA Carmi	>60	---	---	---	Moderate	Low	High.
Ck Ceresco	>60	---	---	---	High	Low	Moderate.
Cl Ceresco	>60	---	---	---	High	Low	Moderate.
Cm Chalmers	>60	---	---	---	High	High	Low.
Co Cohoctah	>60	---	---	---	High	High	Low.
Cp Cohoctah	>60	---	---	---	High	High	Low.
CrC Coloma	>60	---	---	---	Low	Low	Moderate.

TABLE 20.--SOIL FEATURES--Continued

Soil name and map symbol	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
CtA: Crosby	>60	---	---	---	High	High	Moderate.
CwB2:							
Crosby	>60	---	---	---	High	High	Moderate.
Miami	>60	---	---	---	Moderate	Moderate	Moderate.
DmC2, DoC2: Desker	>60	---	---	---	Moderate	Moderate	Moderate.
DpD2:							
Desker	>60	---	---	---	Moderate	Moderate	Moderate.
Rodman	>60	---	---	---	Low	Low	Low.
Du: Drummer	>60	---	---	---	High	High	Moderate.
Dy: Du Page	>60	---	---	---	Moderate	Low	Low.
EkA, EmA: Elston	>60	---	---	---	Moderate	Low	Moderate.
FcB:							
Fincastle	>60	---	---	---	High	High	Moderate.
Crosby	>60	---	---	---	High	High	Moderate.
Hd: Harpster	>60	---	---	---	High	High	Low.
HfB2, HfC2: High Gap Variant	20-40	Soft	---	---	Moderate	High	High.
HnB, HoA: Hononegah	>60	---	---	---	Low	Low	Low.
Hv: Houghton	>60	---	1-4	55-60	High	High	Low.
KaA, KaB2, KbB2, KcB2, KcC2: Kalamazoo	>60	---	---	---	Moderate	Low	Low.
KoD2, KpC3: Kosciusko	>60	---	---	---	Moderate	Low	Moderate.
LaA: Lafayette	>60	---	---	---	High	High	Moderate.
LeA: La Hogue	>60	---	---	---	High	High	Moderate.
Lm: Lash	>60	---	---	---	Moderate	Low	Low.

TABLE 20.--SOIL FEATURES--Continued

Soil name and map symbol	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
LnA, LnB2 Lauramie	>60	---	---	---	Moderate	Moderate	High.
LoA, LoB Linkville	>60	---	---	---	Moderate	Moderate	Moderate.
LvB2, LwB2 Longlois	>60	---	---	---	Moderate	Moderate	High.
Mb Mahalasville	>60	---	---	---	High	High	Low.
Mc Mahalasville	40-60	Soft	---	---	High	High	Low.
Md:							
Mahalasville	>60	---	---	---	High	High	Low.
Treaty	>60	---	---	---	High	High	Low.
MmB2 Marker	>60	---	---	---	High	Moderate	Moderate.
MoA Mellott	>60	---	---	---	High	Moderate	Moderate.
MsC2, MsD2, MtC3, MtD3 Miami	>60	---	---	---	Moderate	Moderate	Moderate.
Mu Milford	>60	---	---	---	High	Moderate	Low.
MwA Mulvey	>60	---	---	---	High	High	High.
Mz Muskego	>60	---	---	35-45	High	Moderate	Moderate.
OaB2:							
Oakville	>60	---	---	---	Low	Low	Moderate.
Billett	>60	---	---	---	Moderate	Low	Moderate.
OgA Ockley	>60	---	---	---	Moderate	Moderate	Moderate.
OmB2, OmC2, OpC3 Octagon	>60	---	---	---	Moderate	High	Moderate.
Ou Ouiatenon	>60	---	---	---	Low	Low	Low.
Ox Ouiatenon	>60	---	---	---	Low	Low	Low.
Oy Ouiatenon	>60	---	---	---	Low	Low	Low.
Pc Palms	>60	---	2-4	25-32	High	High	Moderate.

TABLE 20.--SOIL FEATURES--Continued

Soil name and map symbol	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
Pd: Palms	>60	---	2-4	25-30	High	High	High.
Pg: Pella	>60	---	---	---	High	High	Low.
Pk: Peotone	>60	---	---	---	High	High	Moderate.
PmB: Pinevillage	>60	---	---	---	Moderate	Low	Low.
Pt. Pits							
RaB2: Rainsville	>60	---	---	---	Moderate	Moderate	Moderate.
RcA:							
Raub	>60	---	---	---	High	High	Moderate.
Brenton	>60	---	---	---	High	High	Moderate.
RdA, RdB2, RdC2: Richardville	>60	---	---	---	Moderate	Moderate	High.
RoB: Rockfield	>60	---	---	---	High	High	Moderate.
RsF: Rodman	>60	---	---	---	Low	Low	Low.
Rz: Ross	>60	---	---	---	Moderate	Low	Low.
Sd: Saranac	>60	---	---	---	High	High	Low.
Sf: Sawabash	>60	---	---	---	High	High	Low.
ShB: Shadeland	20-40	Soft	---	---	High	High	Moderate.
SmA: Sleeth	>60	---	---	---	High	High	Low.
Sn: Sloan	>60	---	---	---	High	High	Low.
So: Sloan Variant	20-40	Soft	---	---	High	High	Low.
SrB, SrC: Sparta	>60	---	---	---	Low	Low	Moderate.
StC: Spinks	>60	---	---	---	Low	Low	Low.
SwA:							
Starks	>60	---	---	---	High	High	Moderate.

TABLE 20.--SOIL FEATURES--Continued

Soil name and map symbol	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
SwA:							
Fincastle	>60	---	---	---	High	High	Moderate.
SyF:							
Strawn	>60	---	---	---	Moderate	Moderate	Moderate.
Rodman	>60	---	---	---	Low	Low	Low.
TbA Tecumseh	>60	---	---	---	High	Moderate	Moderate.
TcA Thackery	>60	---	---	---	High	Moderate	Moderate.
TfB Throckmorton	>60	---	---	---	High	Moderate	High.
Tg Tice	>60	---	---	---	High	High	Low.
TmA:							
Toronto	>60	---	---	---	High	High	High.
Millbrook	>60	---	---	---	High	High	Moderate.
TnB2:							
Toronto	>60	---	---	---	High	High	High.
Octagon	>60	---	---	---	Moderate	High	Moderate.
TtA Troxel	>60	---	---	---	High	Low	Moderate.
Ua. Udorthents							
UbB:							
Urban land.							
Billett	>60	---	---	---	Moderate	Low	Moderate.
UcA:							
Urban land.							
Carmi	>60	---	---	---	Moderate	Low	High.
UmB, UmC:							
Urban land.							
Miami	>60	---	---	---	Moderate	Moderate	Moderate.
UsA:							
Urban land.							
Starks	>60	---	---	---	High	High	Moderate.
Fincastle	>60	---	---	---	High	High	Moderate.
Wb Wallkill	>60	---	---	2-10	High	High	Low.

TABLE 20.--SOIL FEATURES--Continued

Soil name and map symbol	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
We: Washtenaw	>60	---	---	---	High	High	Low.
WgA, WhA: Waupecan	>60	---	---	---	High	Moderate	Moderate.
WmA: Waynetown	>60	---	---	---	High	High	Moderate.
WtA: Wea	>60	---	---	---	Moderate	Moderate	Moderate.
WuA: Whitaker	>60	---	---	---	High	High	Moderate.

TABLE 21.--ENGINEERING INDEX TEST DATA

(Dashes indicate that data were not available. MAX means maximum dry density; OPT, optimum moisture; LL, liquid limit; PI, plasticity index; UN, Unified; and NP, nonplastic)

Soil name and location	Parent material	Report number	Depth	Moisture density MAX	Moisture density OPT	Percentage passing sieve-- No. 4	No. 10	No. 40	No. 200	Percentage smaller than-- 0.05 mm	0.02 mm	0.005 mm	0.002 mm	LL	PI	Classification AASHTO	Classification UN
			In	Lb/ cu ft	Pct									Pct			
Drummer silty clay loam:	About 54	S83-IN-157															
2,540 feet east	inches of	3-1	0-9	100	20	---	99	98	90	---	---	---	25	41	17	A-7-6	CL
and 100 feet	silty	3-4	17-23	100	21	---	99	97	87	---	---	---	30	50	29	A-7-6	CL, CH
south of the	material over	3-8	54-70	107	19	---	99	97	84	---	---	---	28	45	25	A-7-6	CL
northwest	glaciofluvial	3-9	70-80	125	11	---	91	84	56	---	---	---	14	22	7	A-4	CL-ML, CL
corner of sec. 6, T. 22 N., R. 3 W.	deposits.																
Mahalasville silty clay loam:	About 38	S83-IN-157															
1,600 feet east	inches of	19-1	0-10	98	22	---	100	98	92	---	---	---	30	44	19	A-7-6	CL
and 50 feet	silty	19-3	13-19	100	22	---	100	100	97	---	---	---	39	58	38	A-7-6	CH
south of the	material over	19-6	38-50	117	14	---	100	97	74	---	---	---	16	26	10	A-4	CL
northwest	glaciofluvial	19-7	50-60	113	12	---	99	89	17	---	---	---	17	NP	NP	A-2-4	SM
corner of sec. 32, T. 23 N., R. 3 W.	deposits.																
Millbrook silt loam:	About 29	S84-IN-157															
1,910 feet west	inches of	33-1	0-9	108	17	---	100	98	82	---	---	---	18	28	8	A-4	CL
and 440 feet	silty	33-4	20-29	107	19	---	100	100	96	---	---	---	39	45	21	A-7-6	CL
south of the	material over	33-5	29-37	107	18	---	100	99	91	---	---	---	29	38	18	A-6	CL
northeast	glaciofluvial	33-7	49-60	124	10	---	100	96	64	---	---	---	7	NP	NP	A-4	ML
corner of sec.	deposits.	33-8	49-60	123	10	---	100	97	34	---	---	---	6	NP	NP	A-2-4	SM
4, T. 21 N., R. 4 W.																	
Waupecan silt loam:	About 35	S83-IN-157															
2,250 feet east	inches of	2-1	0-11	106	16	---	100	99	92	---	---	---	17	28	21	A-6	CL
and 2,120 feet	silty	2-4	24-35	103	21	---	100	99	94	---	---	---	29	40	21	A-6	CL
south of the	material over	2-5	35-44	109	17	---	97	91	66	---	---	---	26	37	19	A-6	CL
northwest	gravelly	2-8	61-70	121	12	---	70	27	4	---	---	---	4	NP	NP	A-1-b	SP
corner of sec. 10, T. 22 N., R. 4 W.	outwash.																

TABLE 22.--CLASSIFICATION OF THE SOILS

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Allison	Fine-silty, mixed, mesic Cumulic Hapludolls
Alvin	Coarse-loamy, mixed, mesic Typic Hapludalfs
Battleground	Fine-silty, mixed, mesic Fluventic Hapludolls
Beecher	Fine, illitic, mesic Udollic Ochraqualfs
Berks	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Billett	Coarse-loamy, mixed, mesic Mollic Hapludalfs
Bowes	Fine-silty, mixed, mesic Mollic Hapludalfs
Bowes Variant	Fine-silty, mixed, mesic Mollic Hapludalfs
Brenton	Fine-silty, mixed, mesic Aquic Argiudolls
Camden	Fine-silty, mixed, mesic Typic Hapludalfs
Carmi	Coarse-loamy, mixed, mesic Typic Hapludolls
Ceresco	Coarse-loamy, mixed, mesic Fluvaquentic Hapludolls
Chalmers	Fine-silty, mixed, mesic Typic Haplaquolls
Cohoctah	Coarse-loamy, mixed, mesic Fluvaquentic Haplaquolls
Coloma	Mixed, mesic Alfic Udipsamments
*Crosby	Fine, mixed, mesic Aeric Ochraqualfs
Desker	Coarse-loamy, mixed, mesic Mollic Hapludalfs
Drummer	Fine-silty, mixed, mesic Typic Haplaquolls
Du Page	Fine-loamy, mixed, mesic Cumulic Hapludolls
*Elston	Coarse-loamy, mixed, mesic Typic Argiudolls
Fincastle	Fine-silty, mixed, mesic Aeric Ochraqualfs
Harpster	Fine-silty, mesic Typic Calciaquolls
High Gap Variant	Fine-loamy, mixed, mesic Ultic Hapludalfs
Hononegah	Sandy, mixed, mesic Entic Hapludolls
Houghton	Euic, mesic Typic Medisaprists
Kalamazoo	Fine-loamy, mixed, mesic Typic Hapludalfs
Kosciusko	Fine-loamy, mixed, mesic Typic Hapludalfs
La Hogue	Fine-loamy, mixed, mesic Aquic Argiudolls
*Lafayette	Fine-silty, mixed, mesic Aquic Argiudolls
Lash	Coarse-loamy, mixed, mesic Fluventic Hapludolls
Lauramie	Fine-loamy, mixed, mesic Mollic Hapludalfs
Linkville	Fine-loamy, mixed, mesic Typic Argiudolls
Longlois	Fine-loamy, mixed, mesic Mollic Hapludalfs
Mahalasville	Fine-silty, mixed, mesic Typic Argiaquolls
Marker	Fine-loamy, mixed, mesic Aquollic Hapludalfs
Mellott	Fine-silty, mixed, mesic Mollic Hapludalfs
Miami	Fine-loamy, mixed, mesic Typic Hapludalfs
Milford	Fine, mixed, mesic Typic Haplaquolls
Millbrook	Fine-silty, mixed, mesic Udollic Ochraqualfs
Mulvey	Fine-silty, mixed, mesic Udollic Ochraqualfs
Muskego	Coprogenous, euic, mesic Limnic Medisaprists
Oakville	Mixed, mesic Typic Udipsamments
Ockley	Fine-loamy, mixed, mesic Typic Hapludalfs
Octagon	Fine-loamy, mixed, mesic Mollic Hapludalfs
Ouiatenon	Sandy, mixed, mesic Fluventic Hapludolls
Palms	Loamy, mixed, euic, mesic Terric Medisaprists
Pella	Fine-silty, mixed, mesic Typic Haplaquolls
Peotone	Fine, montmorillonitic, mesic Cumulic Haplaquolls
Pinevillage	Loamy-skeletal, mixed (calcareous), mesic Typic Udifluvents
Rainsville	Fine-loamy, mixed, mesic Typic Hapludalfs
Raub	Fine-silty, mixed, mesic Aquic Argiudolls
Richardville	Fine-loamy, mixed, mesic Typic Hapludalfs
Rockfield	Fine-silty, mixed, mesic Typic Hapludalfs
*Rodman	Sandy-skeletal, mixed, mesic Typic Hapludolls
Ross	Fine-loamy, mixed, mesic Cumulic Hapludolls
Saranac	Fine, mixed, mesic Fluvaquentic Haplaquolls
Sawabash	Fine-silty, mixed (calcareous), mesic Cumulic Haplaquolls
Shadeland	Fine-loamy, mixed, mesic Aeric Ochraqualfs
Sleeth	Fine-loamy, mixed, mesic Aeric Ochraqualfs
Sloan	Fine-loamy, mixed, mesic Fluvaquentic Haplaquolls

TABLE 22.--CLASSIFICATION OF THE SOILS--Continued

Soil name	Family or higher taxonomic class
Sloan Variant	Fine-loamy, mixed, mesic Fluvaquentic Haplaquolls
*Sparta	Sandy, mixed, mesic Entic Hapludolls
Spinks	Sandy, mixed, mesic Psammentic Hapludalfs
Starks	Fine-silty, mixed, mesic Aeric Ochraqualfs
Strawn	Fine-loamy, mixed, mesic Typic Hapludalfs
Tecumseh	Fine-silty, mixed, mesic Typic Argiudolls
Thackery	Fine-loamy, mixed, mesic Aquic Hapludalfs
Throckmorton	Fine-silty, mixed, mesic Mollic Hapludalfs
*Tice	Fine-silty, mixed, mesic Fluvaquentic Hapludolls
*Toronto	Fine-silty, mixed, mesic Udollic Ochraqualfs
Treaty	Fine-silty, mixed, mesic Typic Argiaquolls
*Troxel	Fine-silty, mixed, mesic Typic Argiudolls
Udorthents	Udorthents
*Wallkill	Fine-loamy, mixed, nonacid, mesic Thapto-Histic Fluvaquents
*Washtenaw	Fine-loamy, mixed, nonacid, mesic Aeric Fluvaquents
Waupecan	Fine-silty, mixed, mesic Typic Argiudolls
Waynetown	Fine-silty, mixed, mesic Aeric Ochraqualfs
Wea	Fine-loamy, mixed, mesic Typic Argiudolls
Whitaker	Fine-loamy, mixed, mesic Aeric Ochraqualfs

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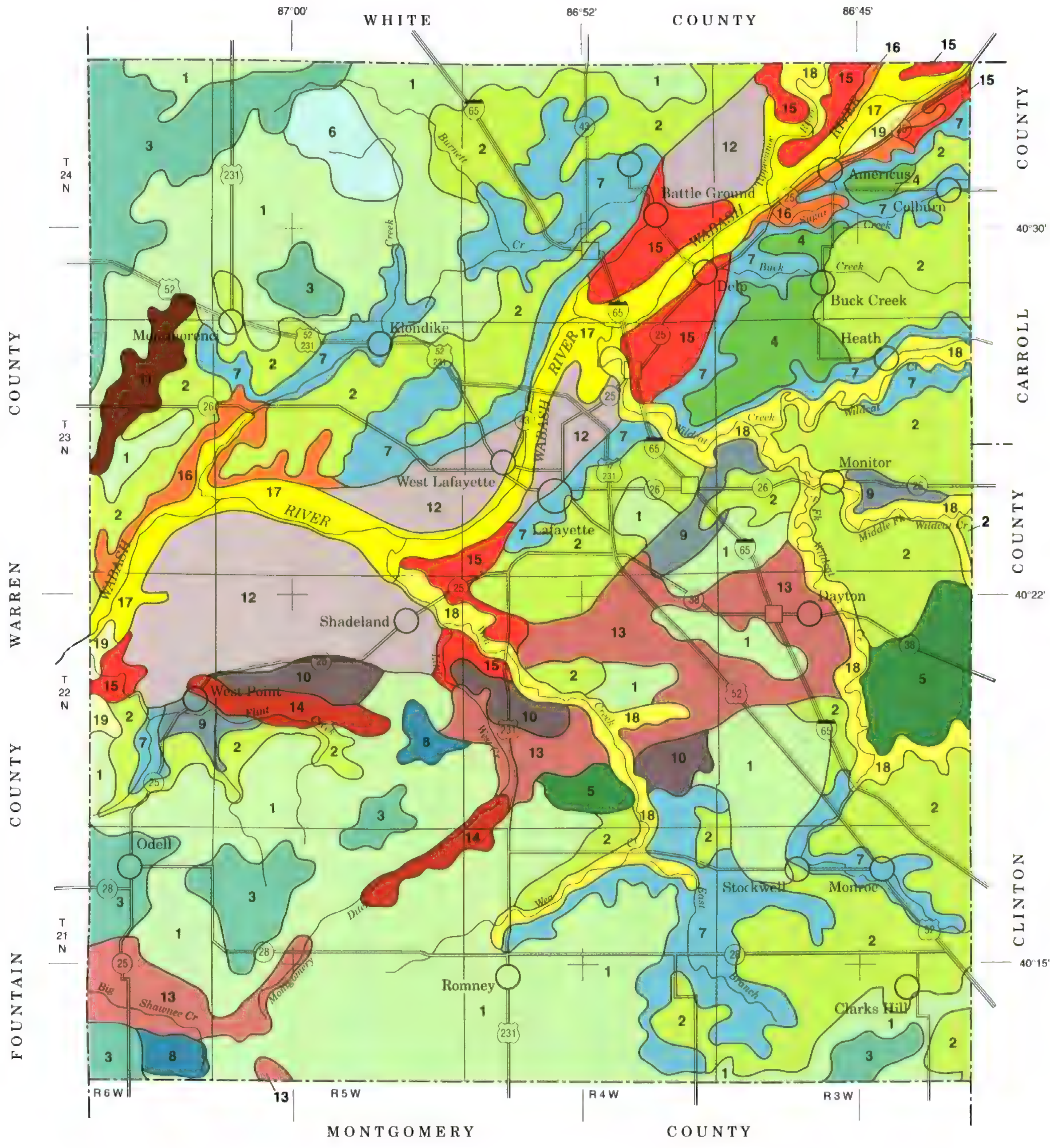


SOIL LEGEND*

VERY POORLY DRAINED, POORLY DRAINED, SOMEWHAT POORLY DRAINED, AND WELL DRAINED, MEDIUM TEXTURED AND MODERATELY FINE TEXTURED, NEARLY LEVEL AND GENTLY SLOPING SOILS; ON GLACIAL TILL PLAINS

- 1 Drummer-Toronto-Millbrook
- 2 Starks-Fincastle
- 3 Drummer-Raub-Brenton
- 4 Crosby-Mahalasville-Treaty
- 5 Fincastle-Crosby-Miami

VERY POORLY DRAINED TO WELL DRAINED, MEDIUM TEXTURED AND MODERATELY FINE TEXTURED, NEARLY LEVEL TO STRONGLY SLOPING SOILS; ON GLACIAL TILL PLAINS, RECESSIONAL MORAINES, AND FLOOD PLAINS

- 6 Marker-Drummer-Beecher
- 7 Miami-Crosby-Richardville
- 8 Octagon-Drummer-Lauramie-Throckmorton
- 9 Camden-Richardville-Starks-Fincastle
- 10 Lauramie-Tecumseh-Linkville, loamy substratum
- 11 Rainsville-Sloan-Miami-Rockfield

WELL DRAINED, SOMEWHAT POORLY DRAINED, AND VERY POORLY DRAINED, MODERATELY FINE TEXTURED TO MODERATELY COARSE TEXTURED, NEARLY LEVEL TO STRONGLY SLOPING SOILS; ON TERRACES, OUTWASH PLAINS, AND KAMES

- 12 Elston, gravelly substratum-Carmi
- 13 Mahalasville, gravelly substratum-Waupecan-Lafayette
- 14 Longlois, kame-Desker, kame
- 15 Billett, gravelly substratum-Kalamazoo

WELL DRAINED AND EXCESSIVELY DRAINED, MEDIUM TEXTURED AND MODERATELY COARSE TEXTURED, MODERATELY STEEP TO VERY STEEP SOILS; ON TILL PLAINS, TERRACES, AND OUTWASH PLAINS

- 16 Strawn-Rodman

EXCESSIVELY DRAINED, SOMEWHAT EXCESSIVELY DRAINED, WELL DRAINED, SOMEWHAT POORLY DRAINED, AND VERY POORLY DRAINED, MEDIUM TEXTURED, TO COARSE TEXTURED, NEARLY LEVEL SOILS; ON FLOOD PLAINS AND LOW TERRACES

- 17 Battleground-Allison-Lash
- 18 Ouiatenon-Ceresco, gravelly substratum-Cohoctah, gravelly substratum Hononegah

MODERATELY WELL DRAINED, SOMEWHAT POORLY DRAINED, AND VERY POORLY DRAINED, MODERATELY FINE TEXTURED AND MEDIUM TEXTURED, NEARLY LEVEL TO MODERATELY SLOPING SOILS; ON UPLANDS AND FLOOD PLAINS

- 19 High Gap Variant-Sloan Variant-Shadeland

* The units on this legend are described in the text under the heading "General Soil Map Units."

Compiled 1990

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

N

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
PURDUE UNIVERSITY AGRICULTURAL EXPERIMENT STATION
INDIANA DEPARTMENT OF NATURAL RESOURCES,
STATE SOIL CONSERVATION BOARD AND DIVISION OF SOIL CONSERVATION

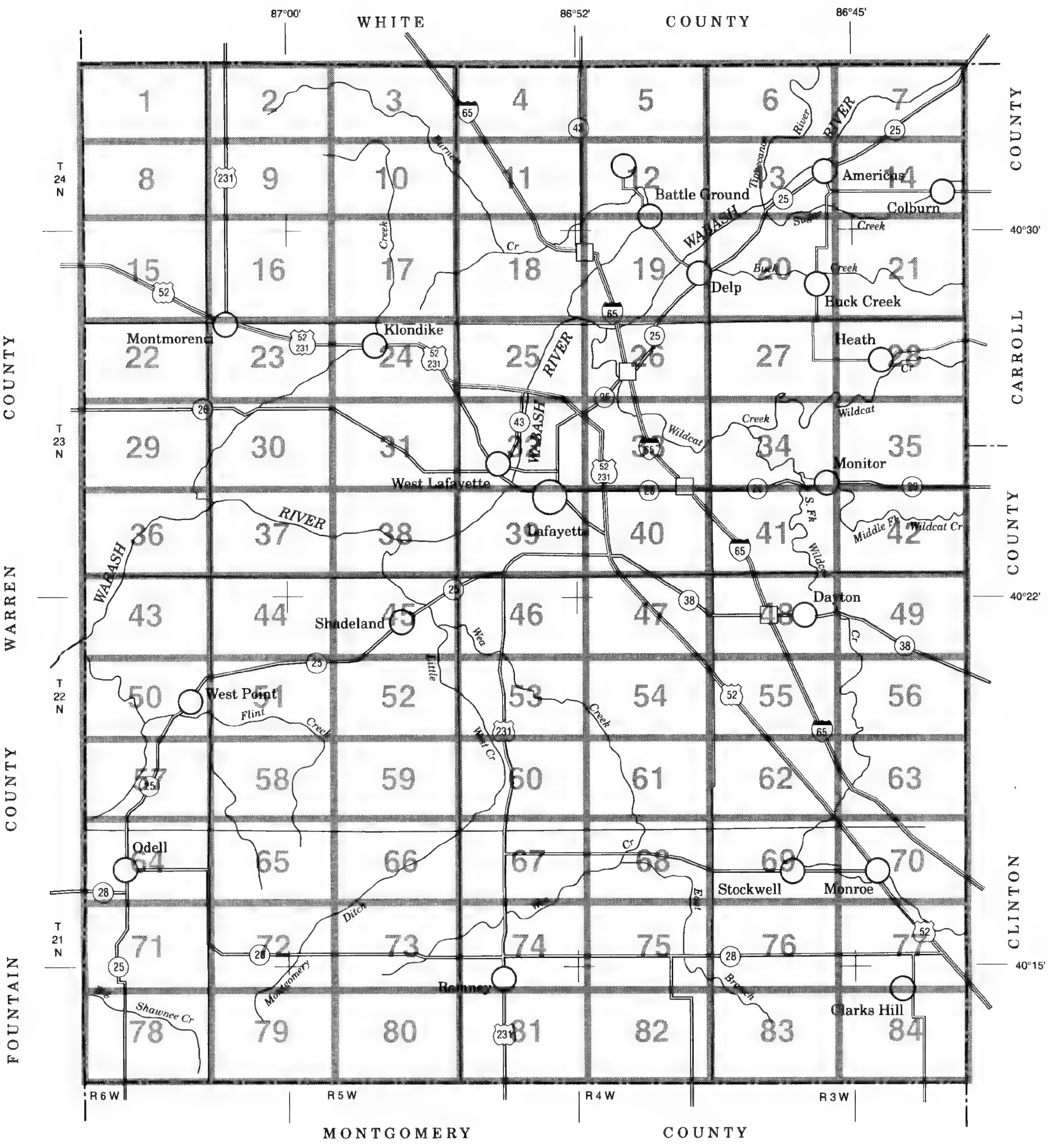
GENERAL SOIL MAP

TIPPECANOE COUNTY, INDIANA

Scale 1:253,440

1 0 1 2 3 4 Miles

1 0 4 8 Km



SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

INDEX TO MAP SHEETS

TIPPECANOE COUNTY, INDIANA

Scale 1:253, 440

1 0 1 2 3 4 Miles

1 0 4 8 Km

SOIL LEGEND

Map symbols consist of a combination of letters or of letters and numbers. The first capital letter is the initial one of the soil name. The second letter is lowercase and separates map units whose names begin with the same letter. The third letter is a capital letter and indicates the class of slope. Symbols without a slope letter are for miscellaneous areas, Udorthents, or nearly level soils. Some symbols have a number at the end and are eroded phases. A final number of 2 indicates that the soil is moderately eroded, and a number 3 indicates that the soil is severely eroded.

SYMBOL	NAME
Am	Allison silt loam, protected
Ap	Allison silt loam, frequently flooded
AtB2	Alvin-Spinks complex, 2 to 6 percent slopes, eroded
Ba	Battleground silt loam, protected
Bb	Battleground silt loam, frequently flooded
BgA	Beecher silt loam, 0 to 2 percent slopes
BkF	Berks channery silt loam, 25 to 60 percent slopes
BlA	Billett fine sandy loam, gravelly substratum, 0 to 2 percent slopes
BlB2	Billett fine sandy loam, gravelly substratum, 2 to 6 percent slopes, eroded
BmA	Billett fine sandy loam, moderately wet, 0 to 2 percent slopes
BnA	Billett loam, gravelly substratum, 0 to 2 percent slopes
BnB2	Billett loam, gravelly substratum, 2 to 6 percent slopes, eroded
BoA	Bowes silt loam, 0 to 2 percent slopes
BpA	Bowes Variant silt loam, 0 to 2 percent slopes
CaA	Camden silt loam, 0 to 2 percent slopes
CfB	Carmi sandy loam, 2 to 6 percent slopes
CgA	Carmi loam, 0 to 2 percent slopes
Ck	Ceresco sandy loam, gravelly substratum, rarely flooded
Cl	Ceresco loam, gravelly substratum, occasionally flooded
Cm	Chalmers silty clay loam
Co	Cohoctah fine sandy loam, gravelly substratum, rarely flooded
Cp	Cohoctah loam, gravelly substratum, occasionally flooded
CrC	Coloma sand, 6 to 15 percent slopes
CtA	Crosby silt loam, 0 to 2 percent slopes
CwB2	Crosby-Miami complex, 2 to 6 percent slopes, eroded
DmC2	Desker gravelly sandy loam, 6 to 12 percent slopes, eroded
DoC2	Desker sandy loam, kame, 6 to 12 percent slopes, eroded
DpD2	Desker-Rodman complex, kame, 12 to 18 percent slopes, eroded
Du	Drummer soils
Dy	Du Page loam, frequently flooded
EkA	Elston sandy loam, gravelly substratum, 0 to 2 percent slopes
EmA	Elston loam, gravelly substratum, 0 to 2 percent slopes
FcB	Fincastle-Crosby complex, 1 to 3 percent slopes
Hd	Harpster silt loam, pothole
HfB2	High Gap Variant silt loam, 1 to 6 percent slopes, eroded
HfC2	High Gap Variant silt loam, 6 to 12 percent slopes, eroded
HnB	Hononegah loamy sand, 2 to 6 percent slopes
HoA	Hononegah fine sandy loam, 0 to 2 percent slopes
Hv	Houghton muck, undrained
KaA	Kalamazoo loam, 0 to 2 percent slopes
KaB2	Kalamazoo loam, 2 to 6 percent slopes, eroded
KbB2	Kalamazoo silt loam, 2 to 6 percent slopes, eroded
KcB2	Kalamazoo silt loam, kame, 2 to 6 percent slopes, eroded
KcC2	Kalamazoo silt loam, kame, 6 to 12 percent slopes, eroded
KoD2	Kosciusko sandy loam, 12 to 18 percent slopes, eroded
KpC3	Kosciusko gravelly sandy clay loam, 6 to 12 percent slopes, severely eroded
LaA	Lafayette silt loam, 0 to 2 percent slopes
LeA	La Hogue loam, till substratum, 0 to 2 percent slopes
Lm	Lash silt loam, frequently flooded
LnA	Lauramie silt loam, 0 to 2 percent slopes
LnB2	Lauramie silt loam, 2 to 6 percent slopes, eroded
LoA	Linkville loam, loamy substratum, 0 to 2 percent slopes
LoB	Linkville loam, loamy substratum, 2 to 6 percent slopes
LvB2	Longlois silt loam, 2 to 6 percent slopes, eroded
LwB2	Longlois silt loam, kame, 2 to 6 percent slopes, eroded
Mb	Mahalasville silty clay loam, gravelly substratum
Mc	Mahalasville silty clay loam, shale substratum
Md	Mahalasville-Treaty complex
MmB2	Marker silt loam, 2 to 6 percent slopes, eroded
MoA	Mellott silt loam, 0 to 2 percent slopes
MsC2	Miami silt loam, 6 to 12 percent slopes, severely eroded
MsD2	Miami silt loam, 12 to 18 percent slopes, eroded
MtC3	Miami clay loam, 6 to 12 percent slopes, eroded
MtD3	Miami clay loam, 12 to 18 percent slopes, severely eroded
Mu	Milford silty clay loam, pothole
MwA	Mulvey silt loam, 0 to 2 percent slopes
Mz	Muskego muck, drained
OaB2	Oakville-Billett moderately wet, complex, 2 to 6 percent slopes, eroded
OgA	Ockley silt loam, 0 to 2 percent slopes
OmB2	Octagon silt loam, 2 to 6 percent slopes, eroded
OmC2	Octagon silt loam, 6 to 12 percent slopes, eroded
OpC3	Octagon clay loam, 6 to 12 percent slopes, severely eroded
Ou	Ouiatenon sandy loam, frequently flooded
Ox	Ouiatenon loamy sand, occasionally flooded
Oy	Ouiatenon fine sandy loam, sandy substratum, frequently flooded
Pc	Palms muck, drained
Pd	Palms muck, gravelly substratum, undrained
Pg	Pella silty clay loam, pothole
Pk	Peotone silty clay loam, pothole
PmB	Pinevillage gravelly sandy loam, 2 to 8 percent slopes, rarely flooded
Pt	Pits, gravel
RaB2	Rainsville silt loam, 2 to 6 percent slopes, eroded
RcA	Raub-Brenton complex, 0 to 1 percent slopes
RdA	Richardville silt loam, 0 to 2 percent slopes
RdB2	Richardville silt loam, 2 to 6 percent slopes, eroded
RdC2	Richardville silt loam, 6 to 12 percent slopes, eroded
RoB	Rockfield silt loam, 1 to 3 percent slopes
RsF	Rodman gravelly loam, 25 to 60 percent slopes
Rz	Ross silt loam, protected
Sd	Saranac silty clay, gravelly substratum, occasionally flooded
Sf	Sawabash silty clay loam, frequently flooded
ShB	Shadeland silt loam, 1 to 4 percent slopes
SmA	Sleeth loam, 0 to 2 percent slopes
Sn	Sloan clay loam, occasionally flooded
So	Sloan Variant silty clay loam, occasionally flooded
SrB	Sparta sand, 2 to 6 percent slopes
SrC	Sparta sand, 6 to 12 percent slopes
StC	Spinks fine sand, 6 to 12 percent slopes
SwA	Starks-Fincastle complex, 0 to 2 percent slopes
SyF	Strawn-Rodman complex, 18 to 50 percent slopes
TbA	Tecumseh silt loam, 0 to 2 percent slopes
TcA	Thackery silt loam, 0 to 2 percent slopes
TfB	Throckmorton silt loam, 1 to 3 percent slopes
Tg	Tice silty clay loam, frequently flooded
TmA	Toronto-Millbrook complex, 0 to 2 percent slopes
TnB2	Toronto-Octagon complex, 2 to 6 percent slopes, eroded
TtA	Troxel silty clay loam, 0 to 2 percent slopes
Ua	Udorthents, loamy
UbB	Urban land-Billett, gravelly substratum, complex, 2 to 8 percent slopes
UcA	Urban land-Carmi complex, 0 to 2 percent slopes
UmB	Urban land-Miami complex, 2 to 8 percent slopes
UmC	Urban land-Miami complex, 8 to 15 percent slopes
UsA	Urban land-Starks-Fincastle complex, 0 to 2 percent slopes
Wb	Wallkill silt loam, coprogenous earth substratum
We	Washtenaw silt loam
WgA	Waupecan silt loam, 0 to 2 percent slopes
WhA	Waupecan silt loam, moderately wet, 0 to 2 percent slopes
WmA	Waynetown silt loam, 0 to 2 percent slopes
WtA	Wea silt loam, occasionally flooded
WuA	Whitaker loam, till substratum, 0 to 2 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES
- National, state, or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline and neatline

AD HOC BOUNDARY (label)
- Small airport, airfield, park, oilfield, cemetery, or flood pool

STATE COORDINATE TICK
1 890 000 FEET

LAND DIVISION CORNER (sections and land grants)

ROADS
- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS
- Interstate (66)
- Federal (287)
- State (52)
- County, farm or ranch (398)

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES
- Without road
- With road
- With railroad

DAMS
- Large (to scale)
- Medium or Small (Named where applicable)

PITS
- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES
- Farmstead, house (omit in urban area) (occupied)
- Church
- School
- Indian mound (label)
- Located object (label) — Tower
- Tank (label) — Gas
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE
- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) — CANAL
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS
- Perennial
- Intermittent

MISCELLANEOUS WATER FEATURES
- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

All miscellaneous water features typically range from 1/4 to 2 acres in size

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — Dy HfC2

ESCARPMENTS
- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

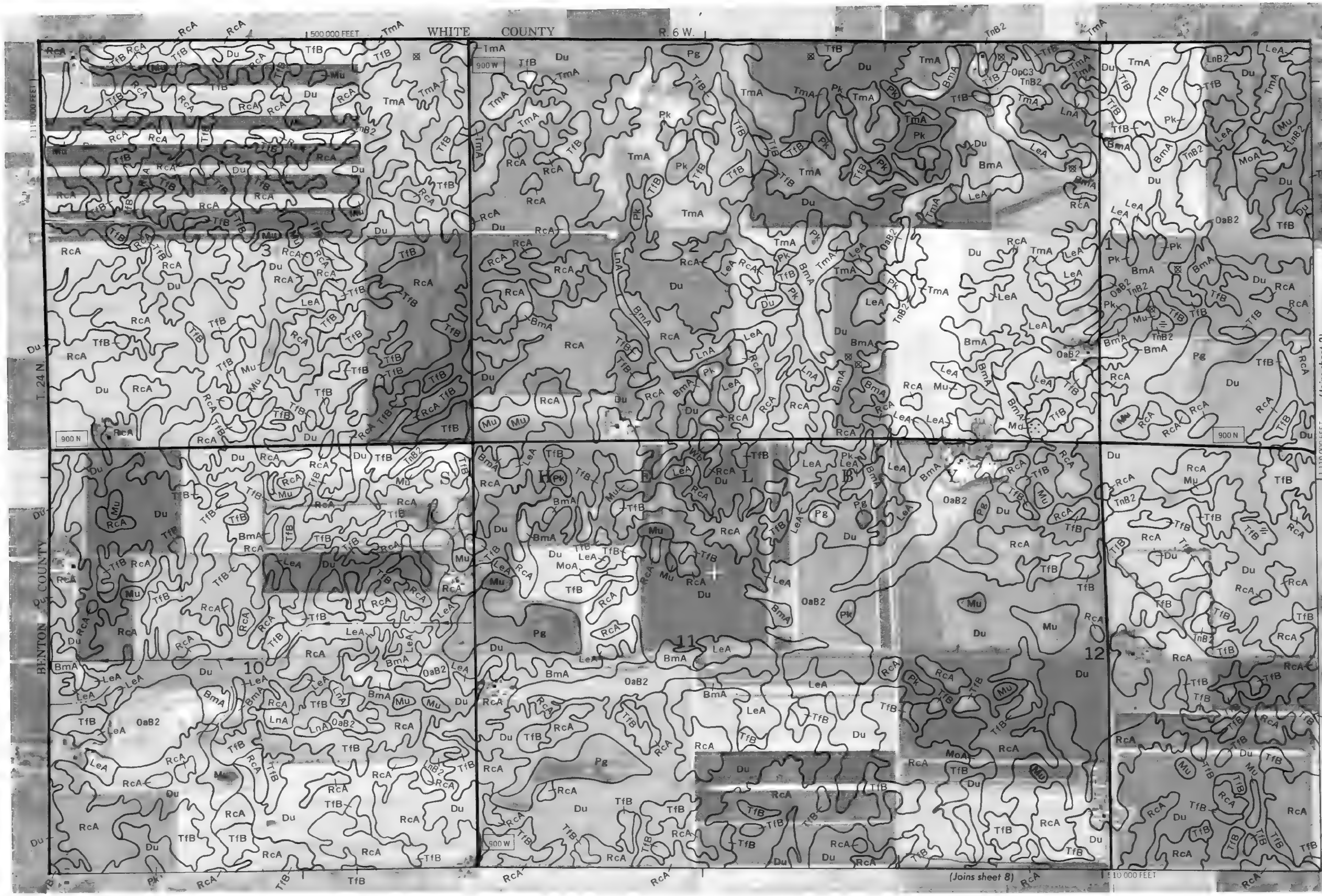
SOIL SAMPLE (normally not shown)

MISCELLANEOUS
- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot
- Overwash spot
- Muck spot
- Landfill
- Calcareous spot
- Siltstone at 40-60 inches
- Black shale at 20-40 inches

All miscellaneous special symbols typically range from 1/4 to 2 acres in size.

1

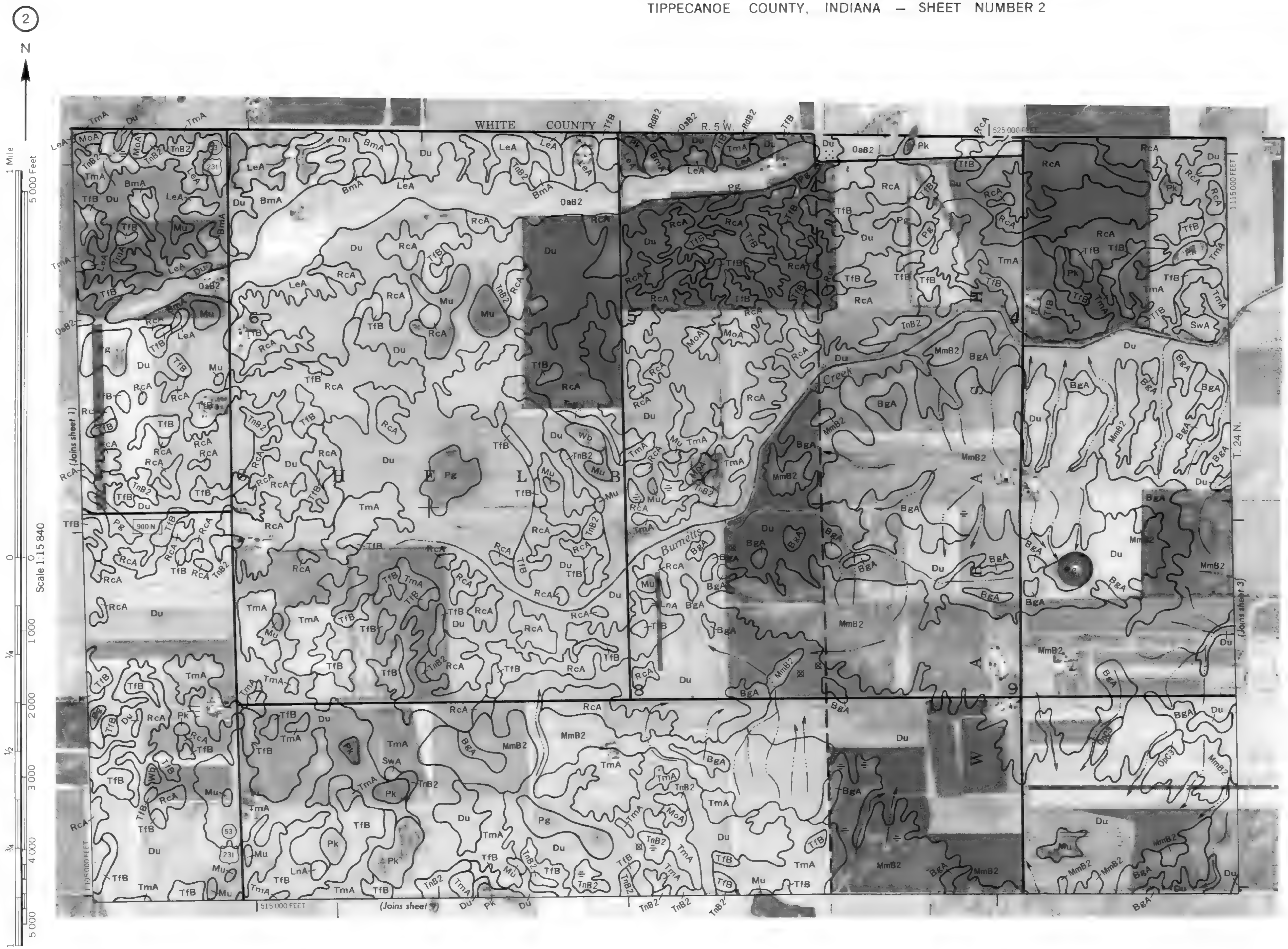
N



1 Mile
5 000 Feet
Scale 1:15 840
0 1000 2000 3000 4000 5000

TIPPECANOE COUNTY, INDIANA NO. 1

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



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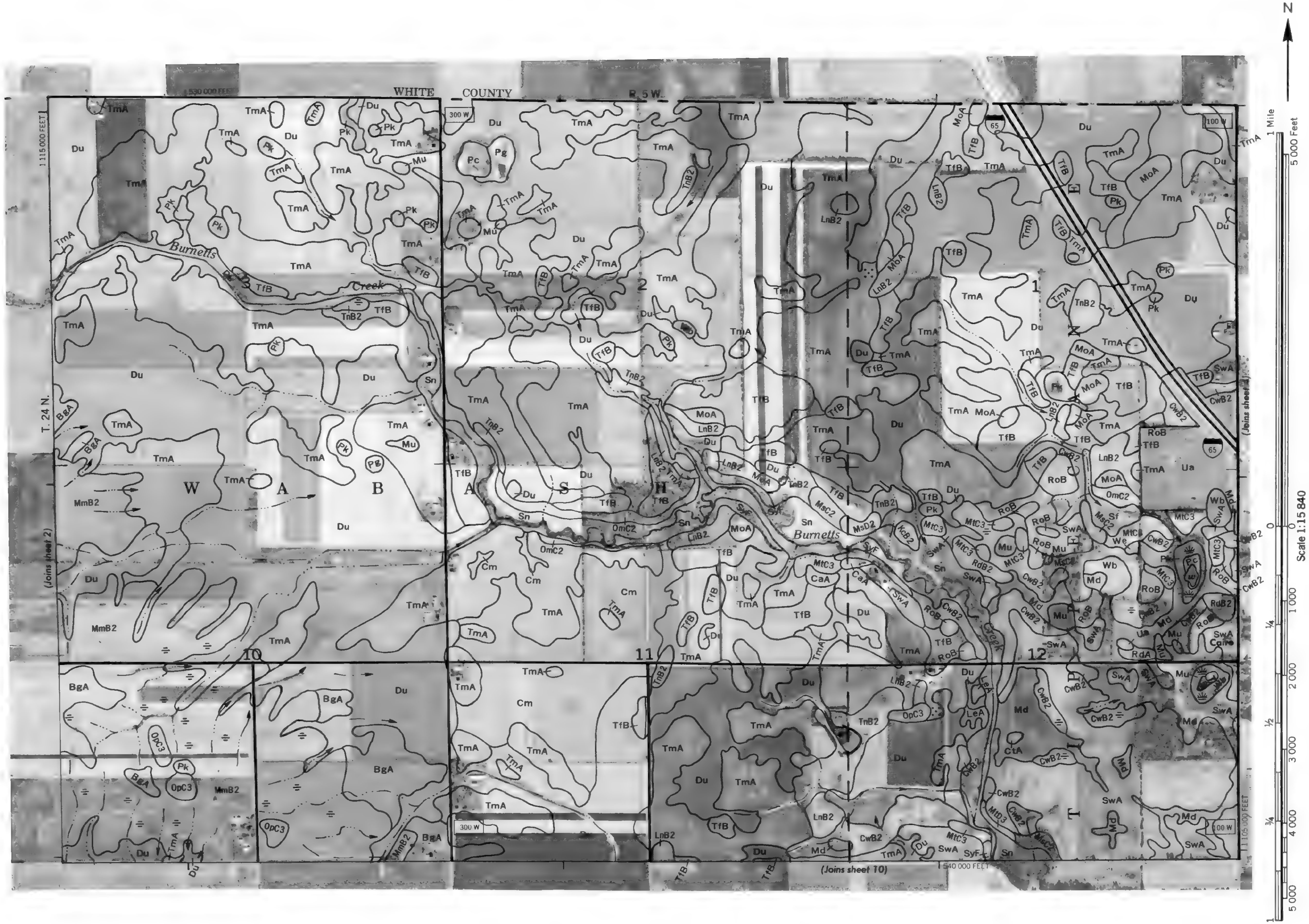
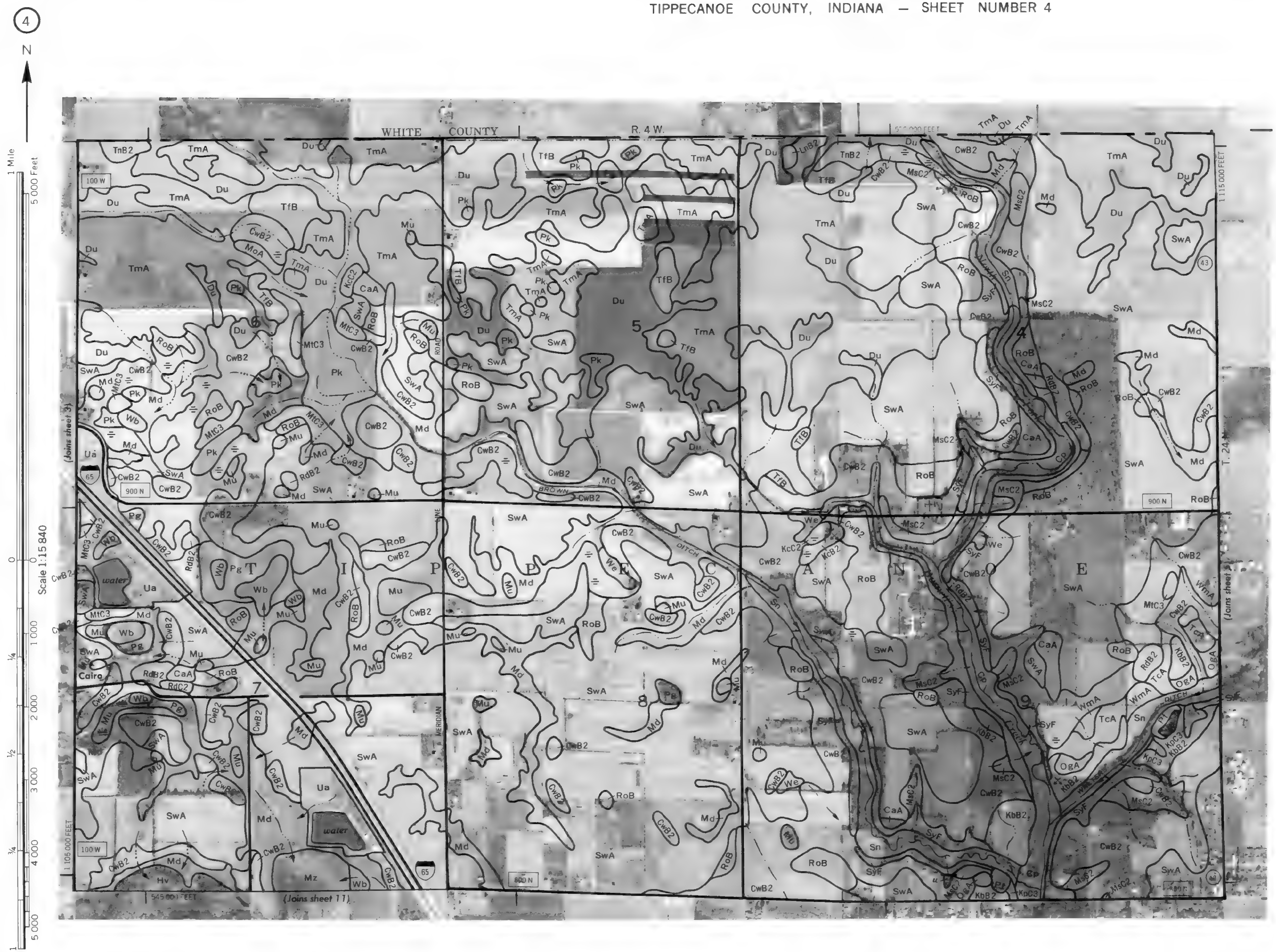
TIPPECANOE COUNTY, INDIANA NO. 2

3



TIPPECANOE COUNTY, INDIANA NO. 3

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned



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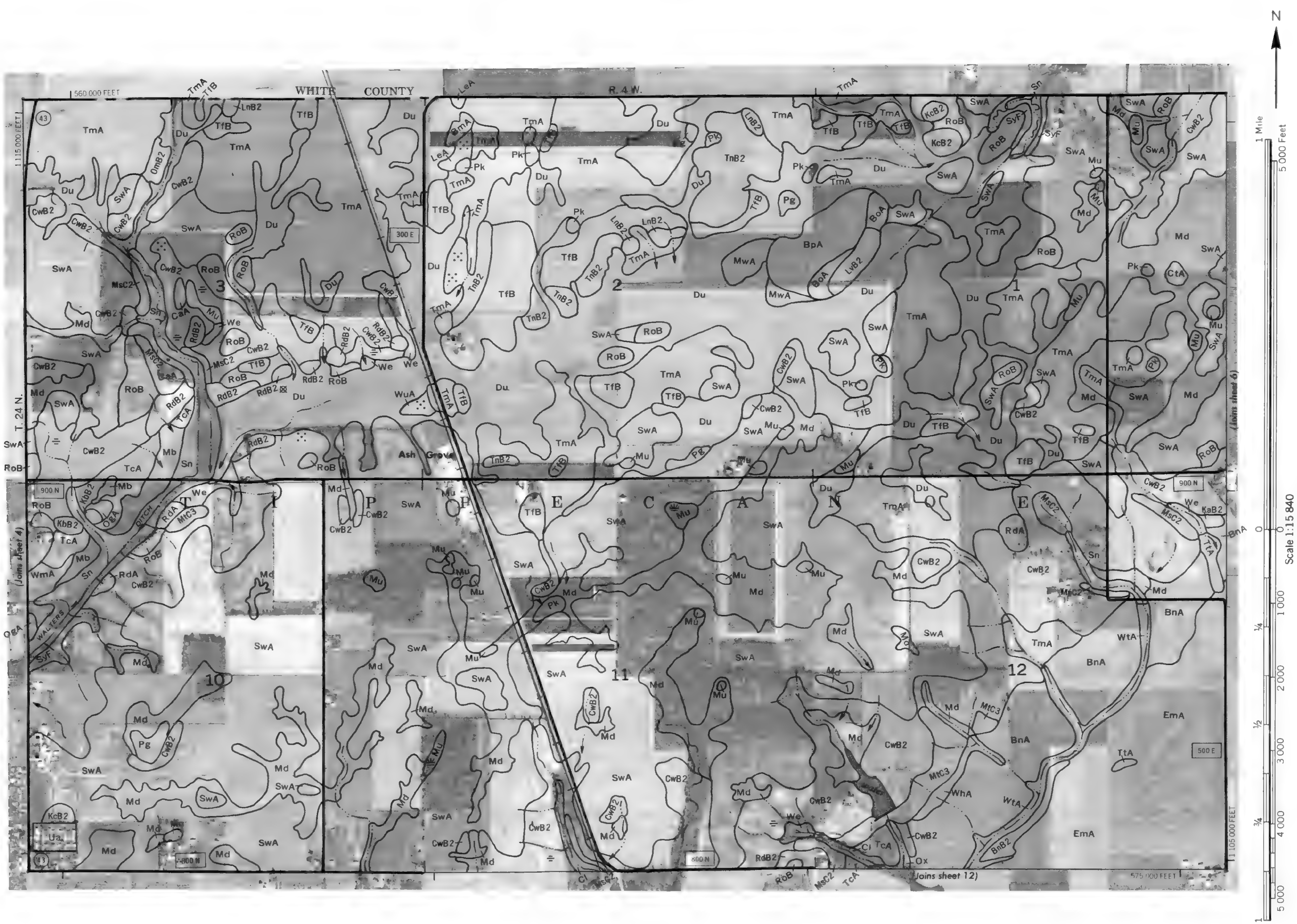
TIPPECANOE COUNTY, INDIANA NO. 4

5



TIPPECANOE COUNTY, INDIANA NO. 5

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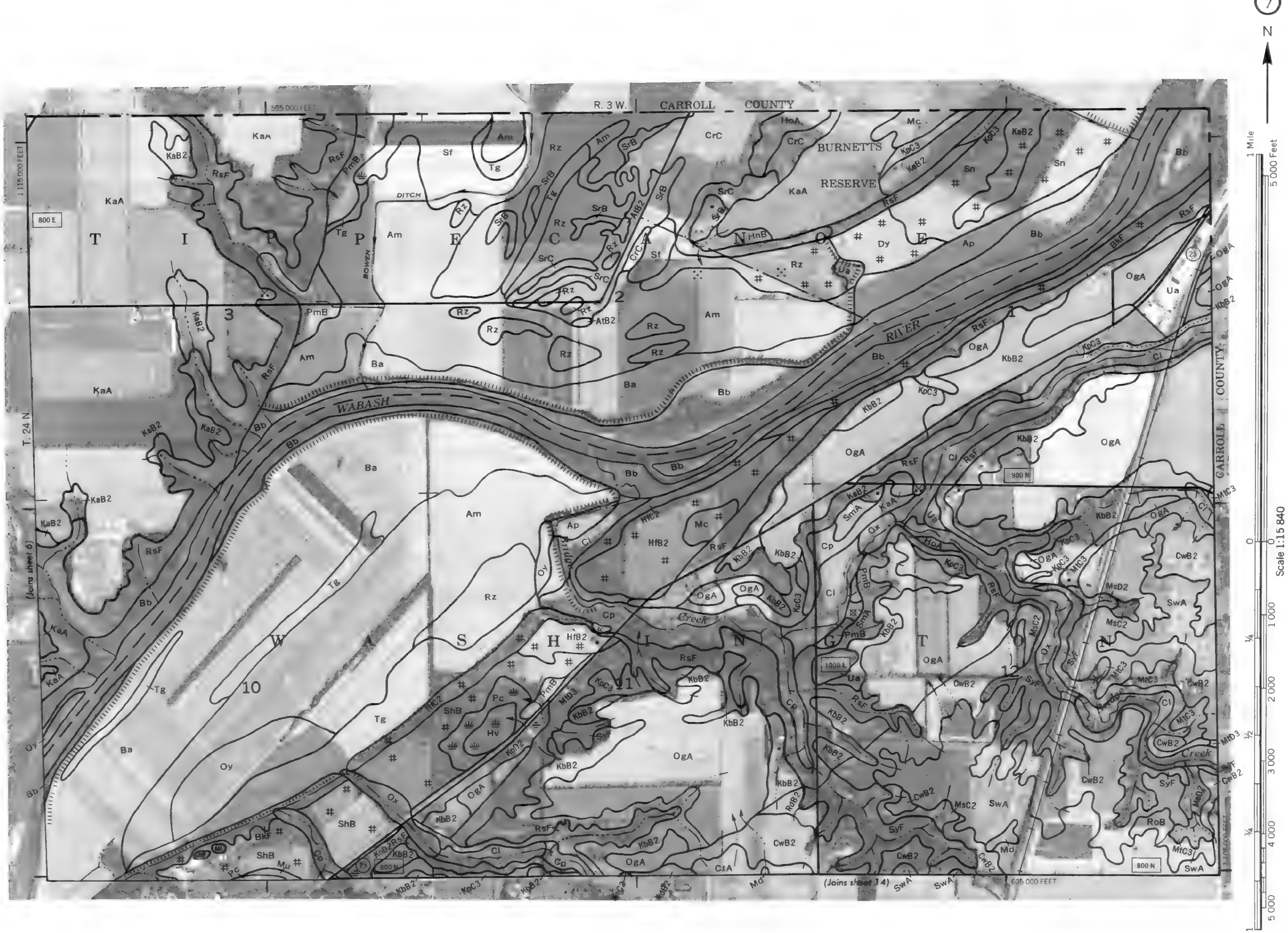
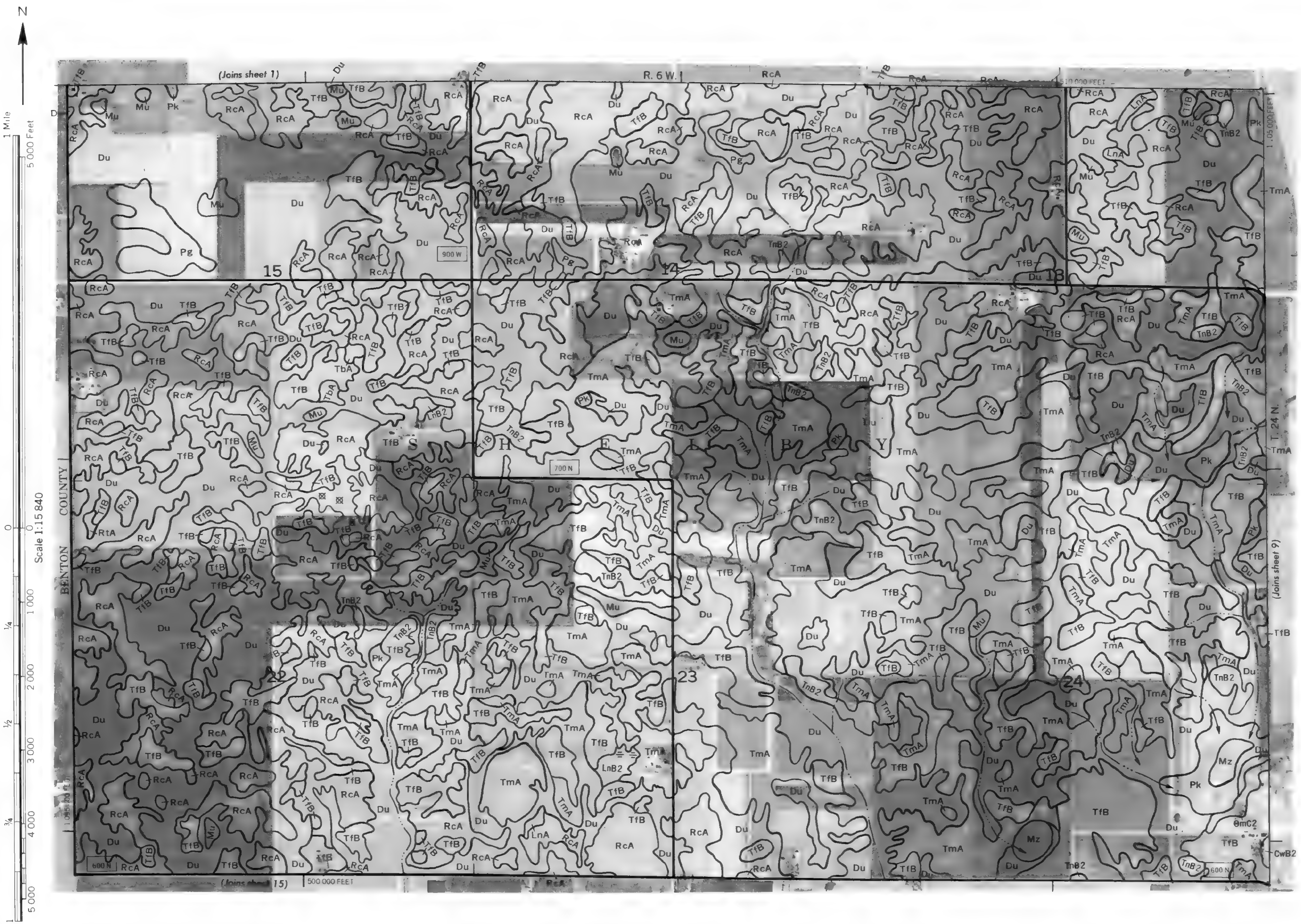


TIPPECANOE COUNTY, INDIANA NO. 7

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

TIPPECANOE COUNTY, INDIANA — SHEET NUMBER 8



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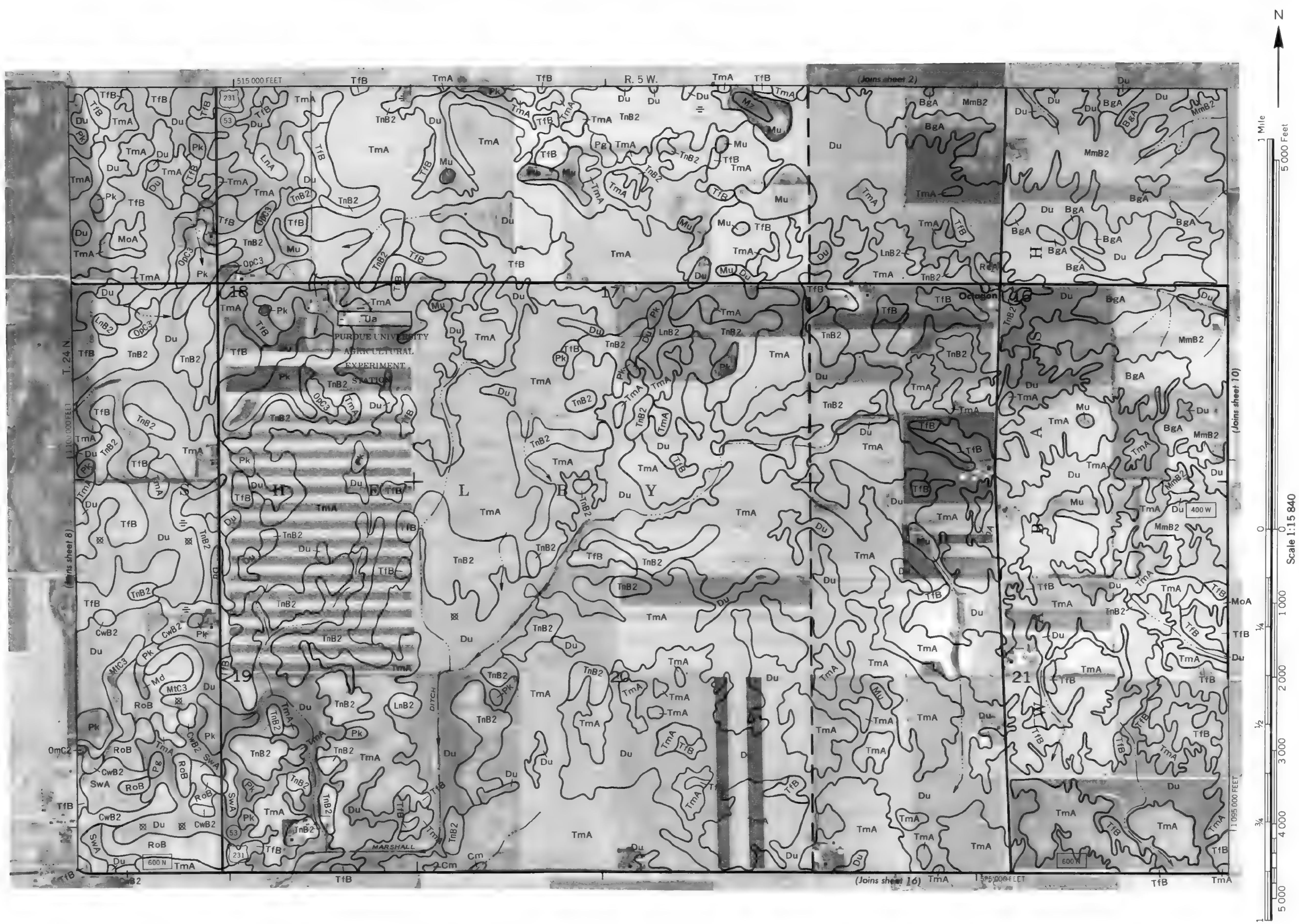
TIPPECANOE COUNTY, INDIANA NO. 8



TIPPECANOE COUNTY, INDIANA NO. 9

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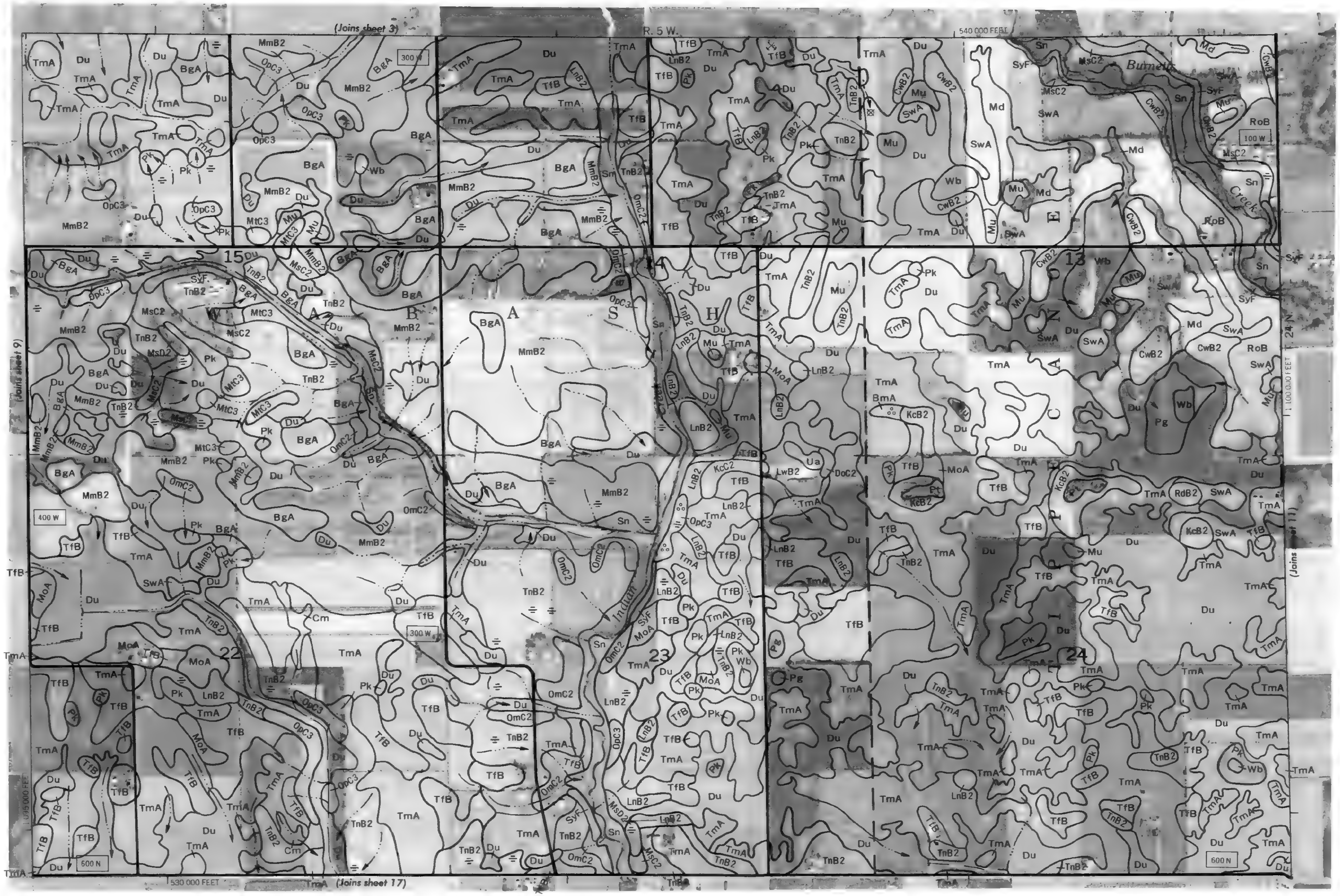
10

N

1 Mile

5 000 Feet

Scale 1:15 840



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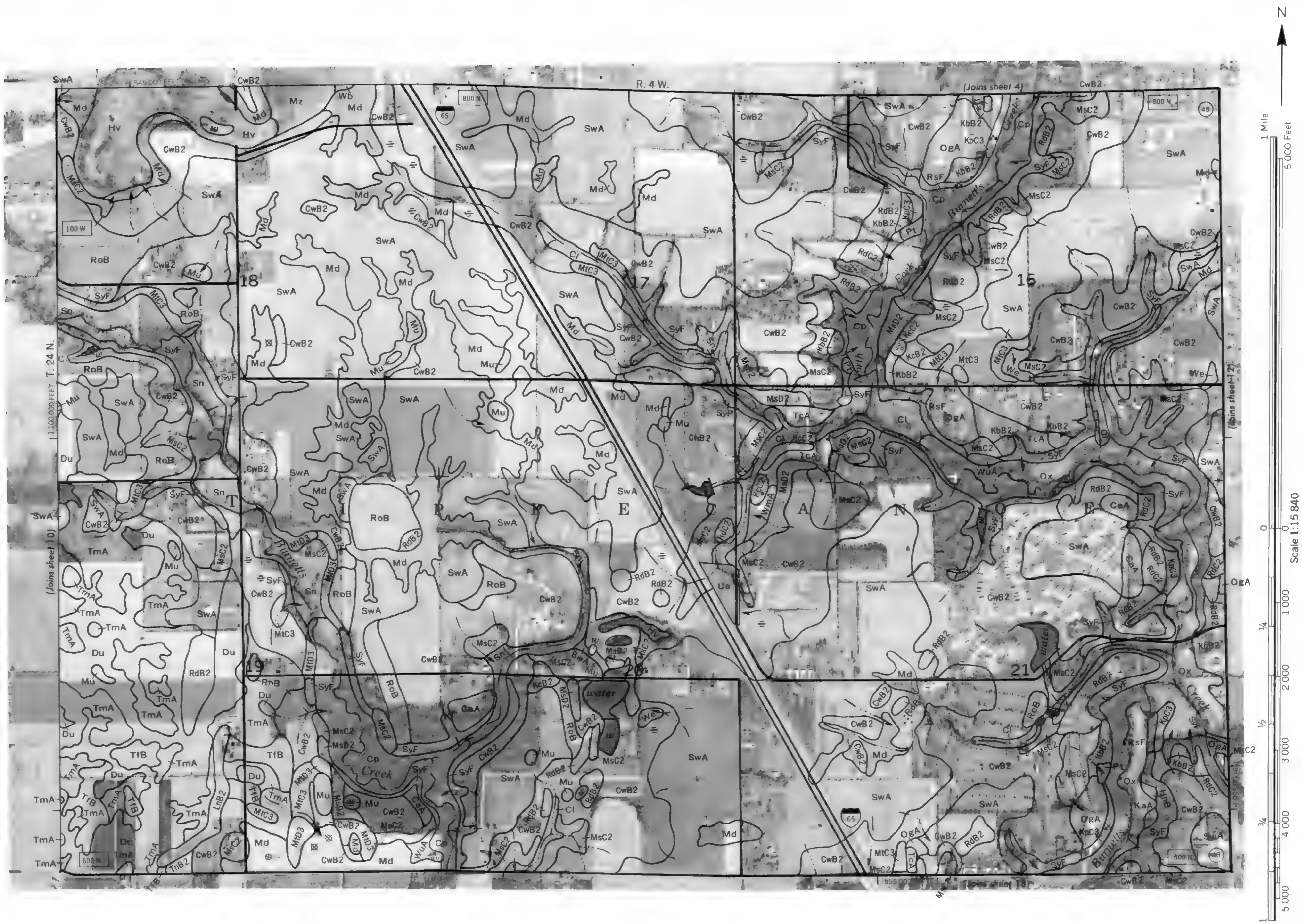
11



TIPPECANOE COUNTY, INDIANA NO. 11

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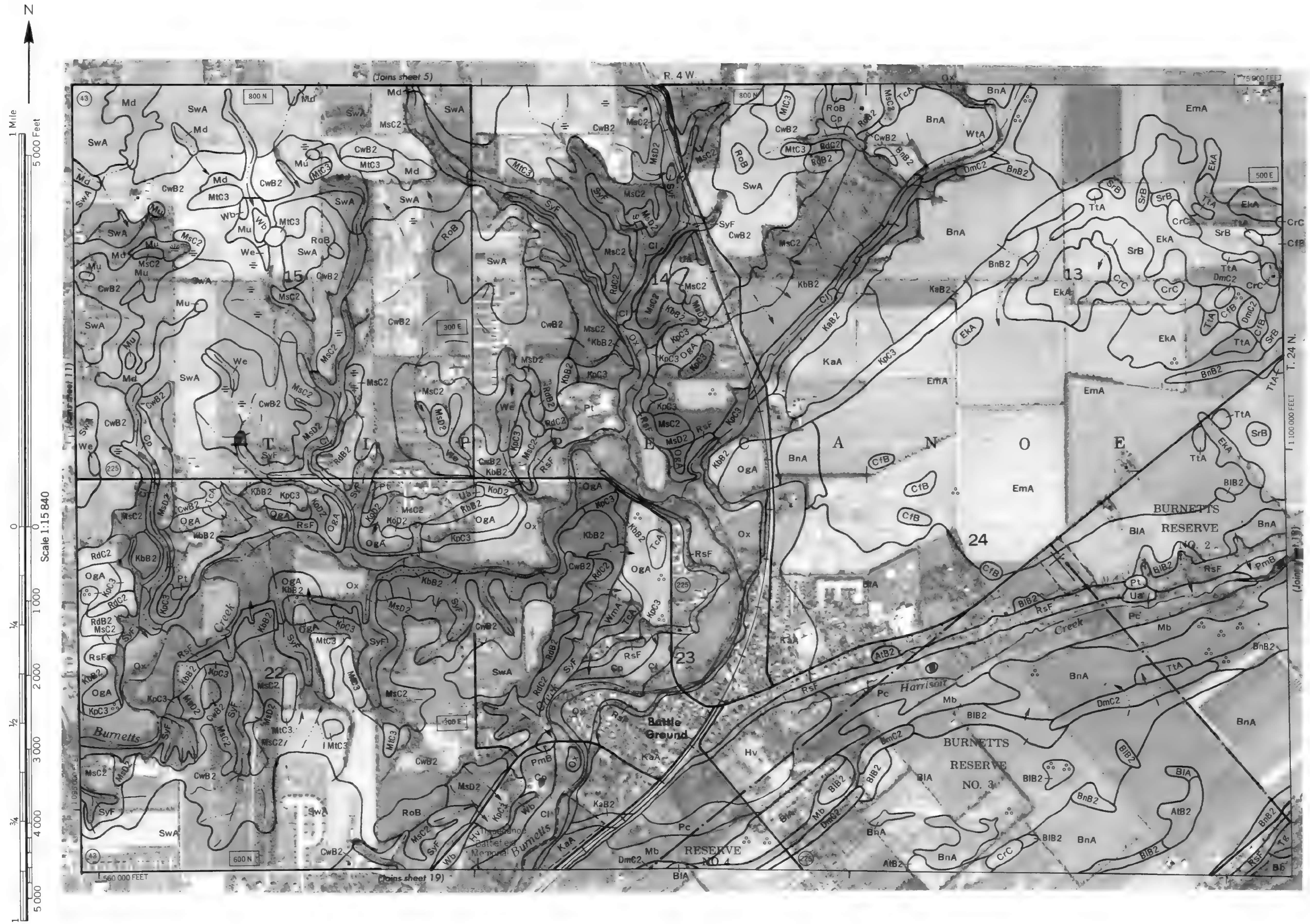

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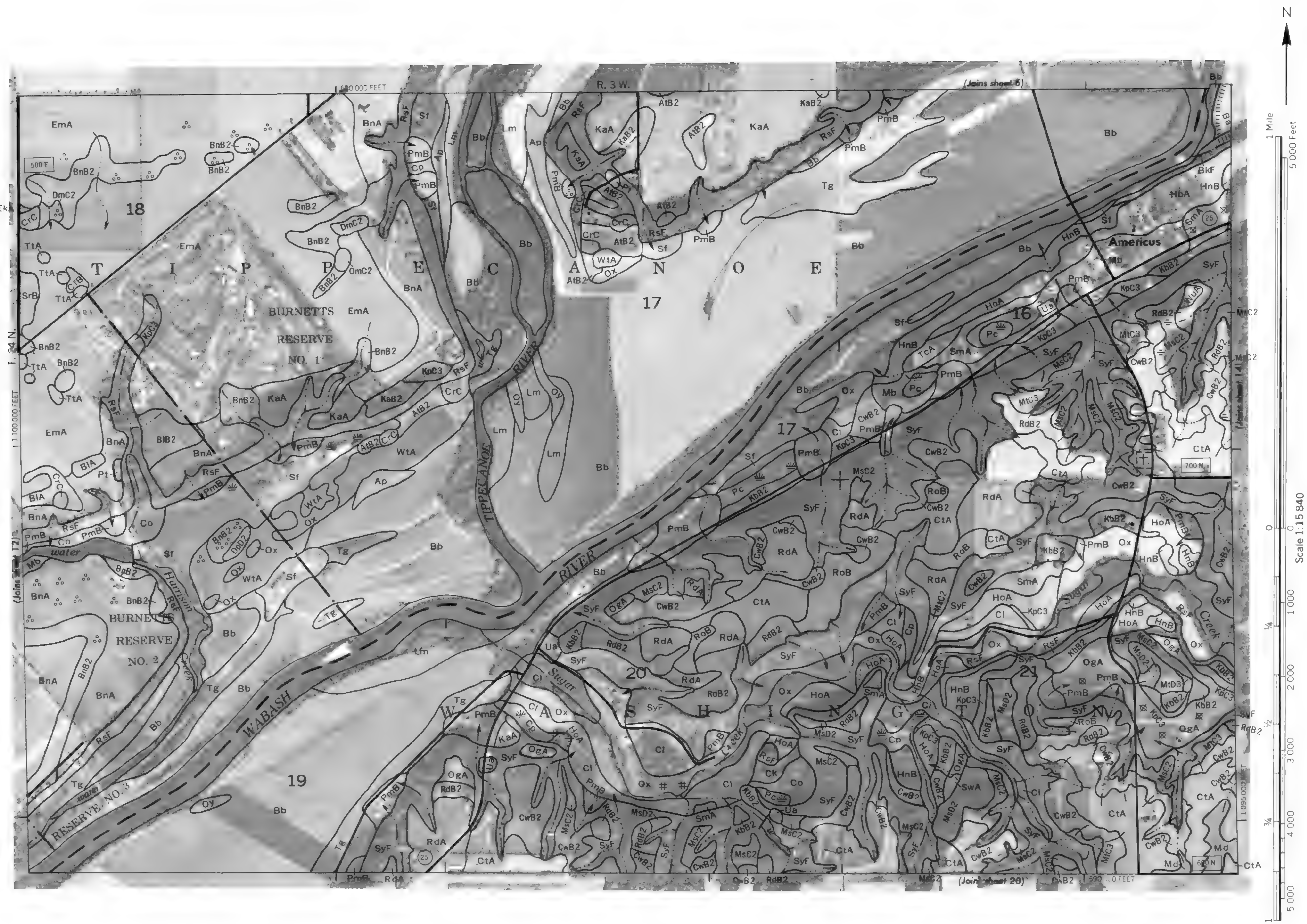
TIPPECANOE COUNTY, INDIANA NO. 12



TIPPECANOE COUNTY, INDIANA NO. 13

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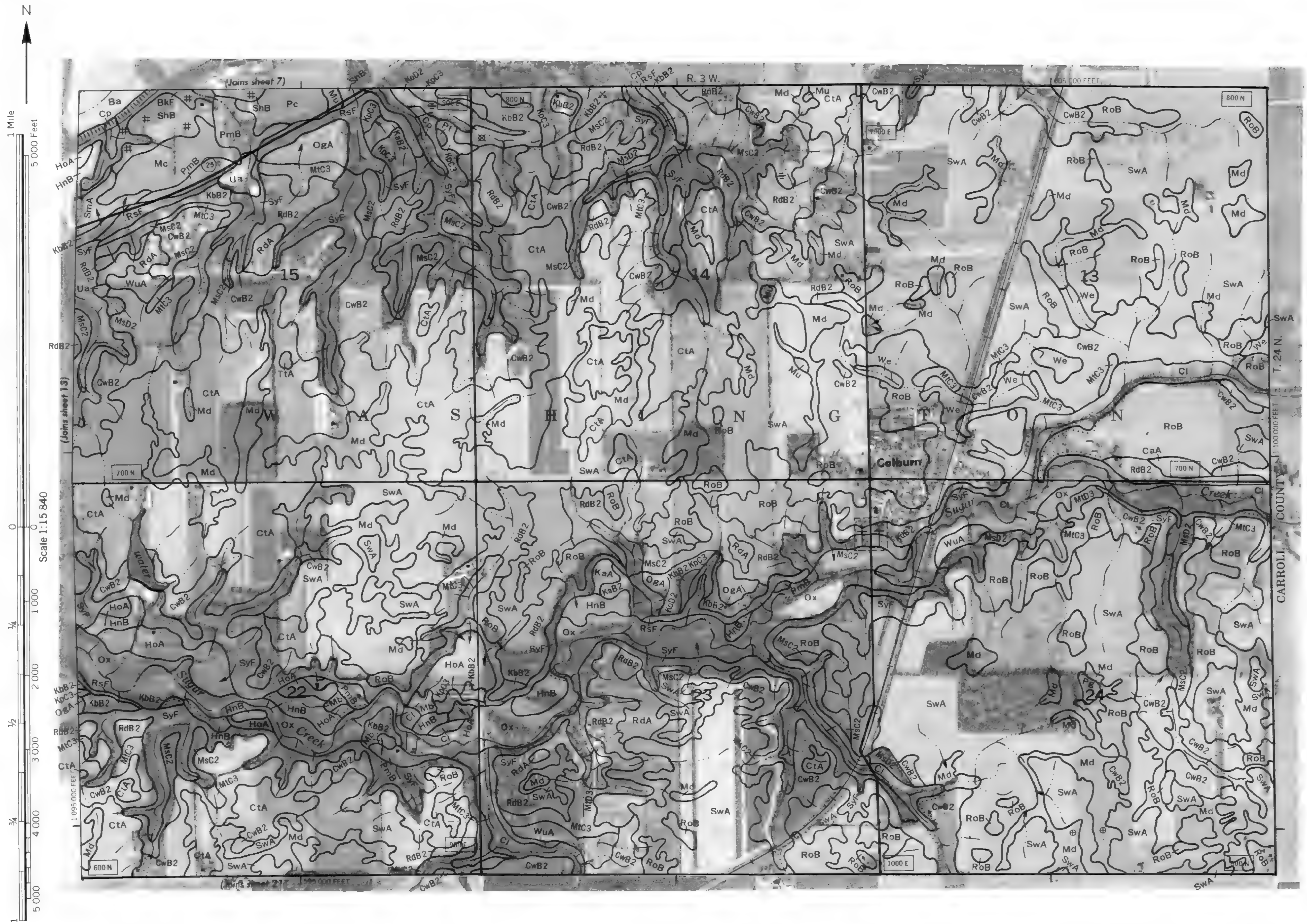
14



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TIPPECANOE COUNTY, INDIANA NO. 15

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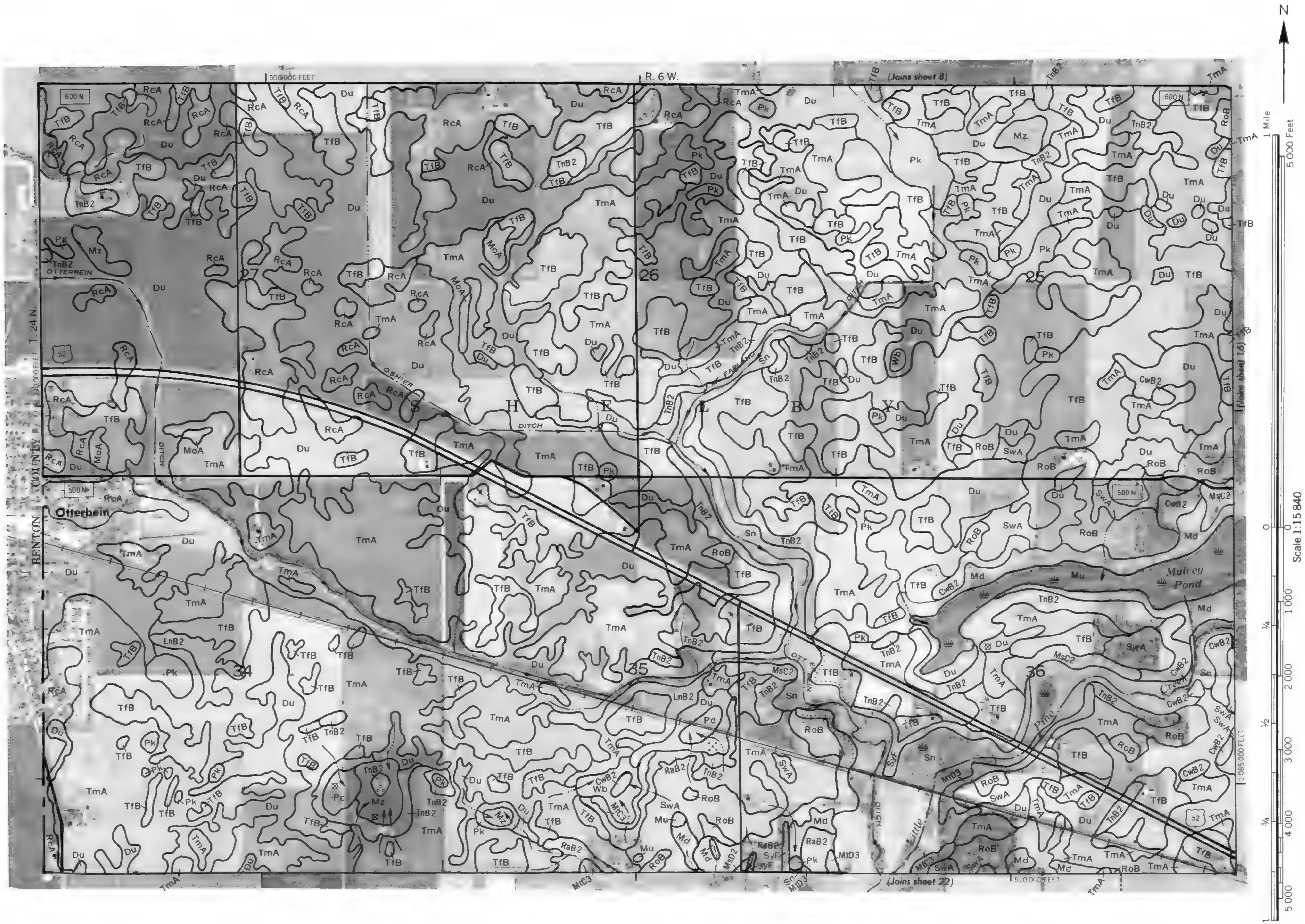

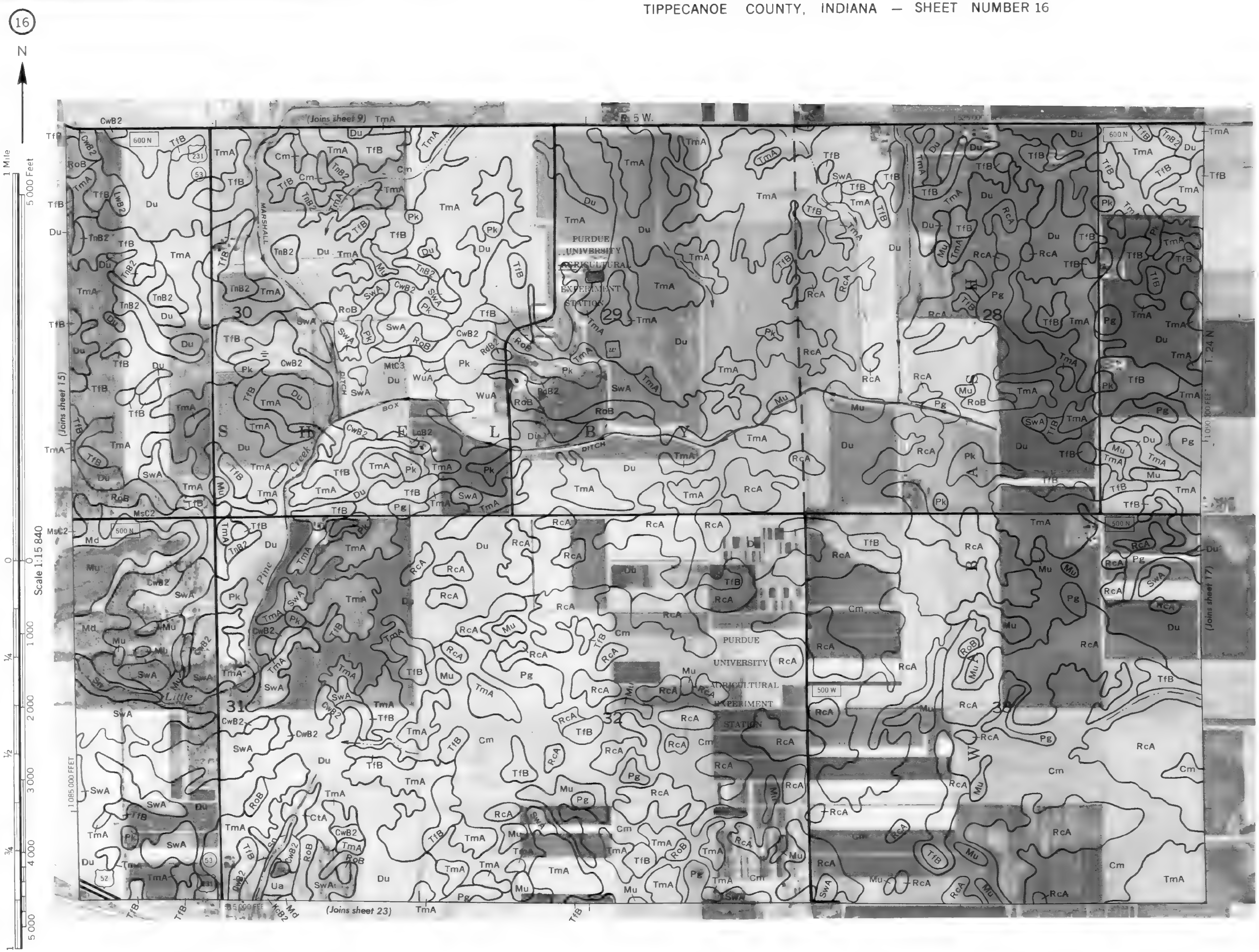

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TIPPECANOE COUNTY, INDIANA NO. 17

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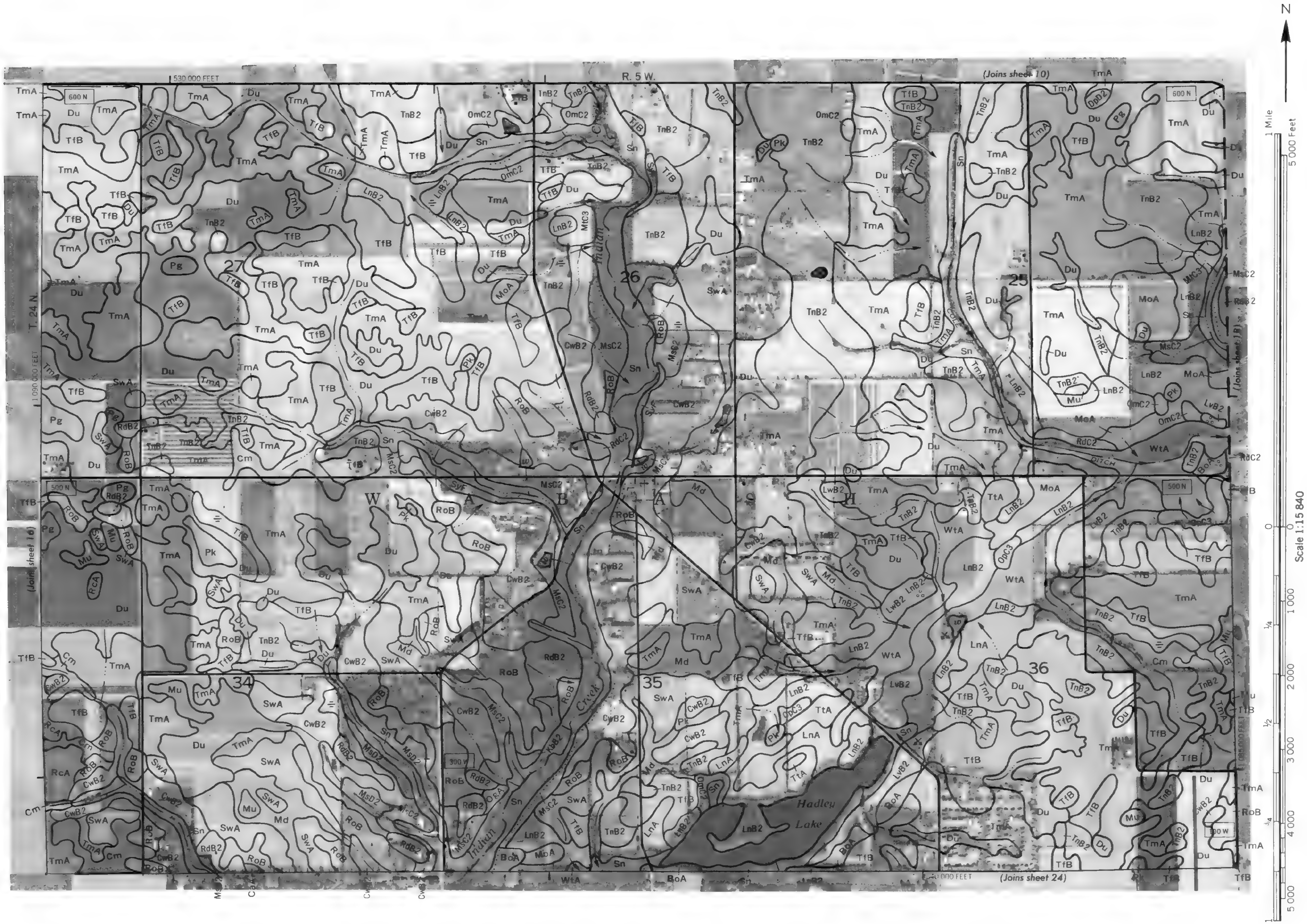

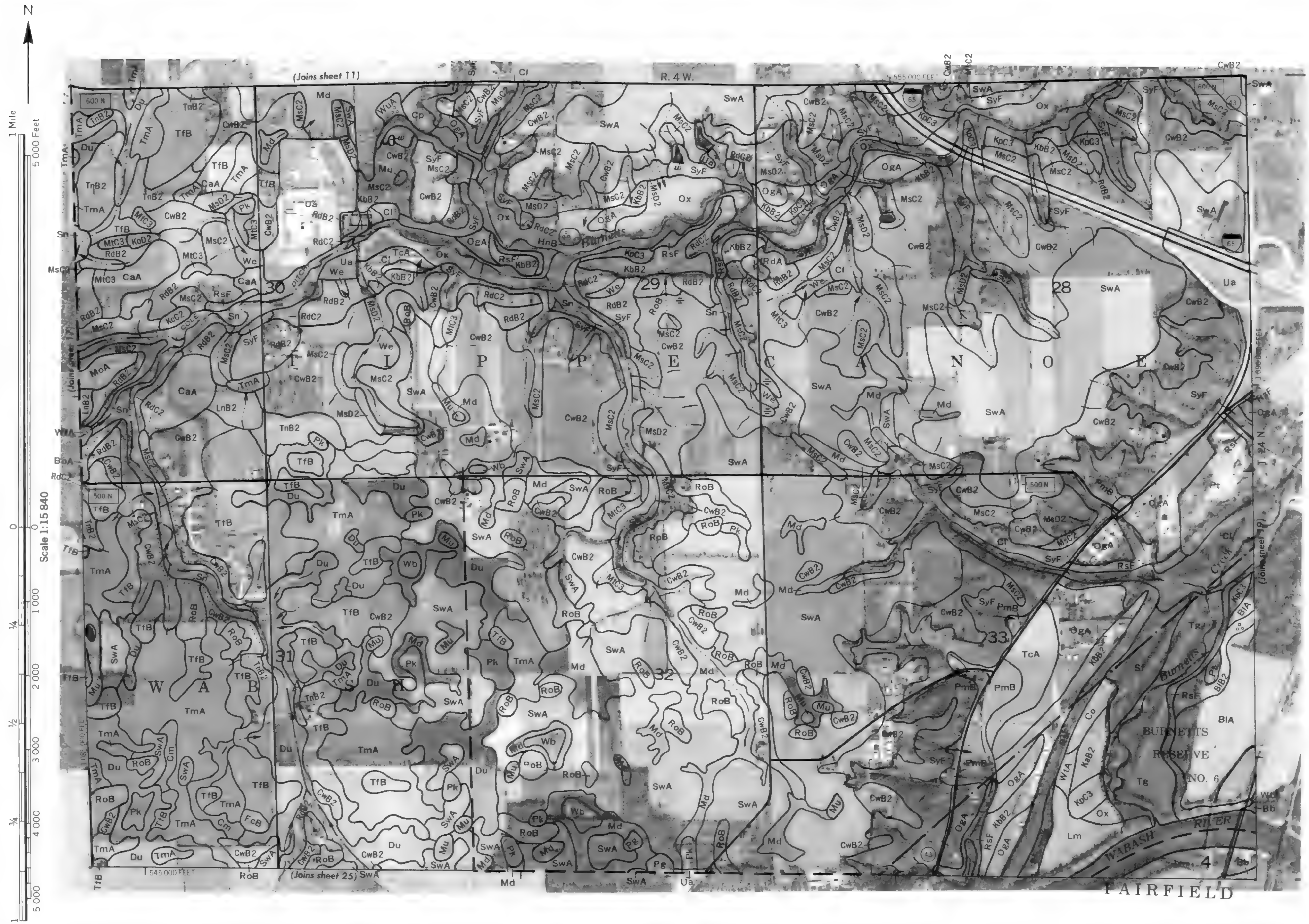

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TIPPECANOE COUNTY, INDIANA NO. 19

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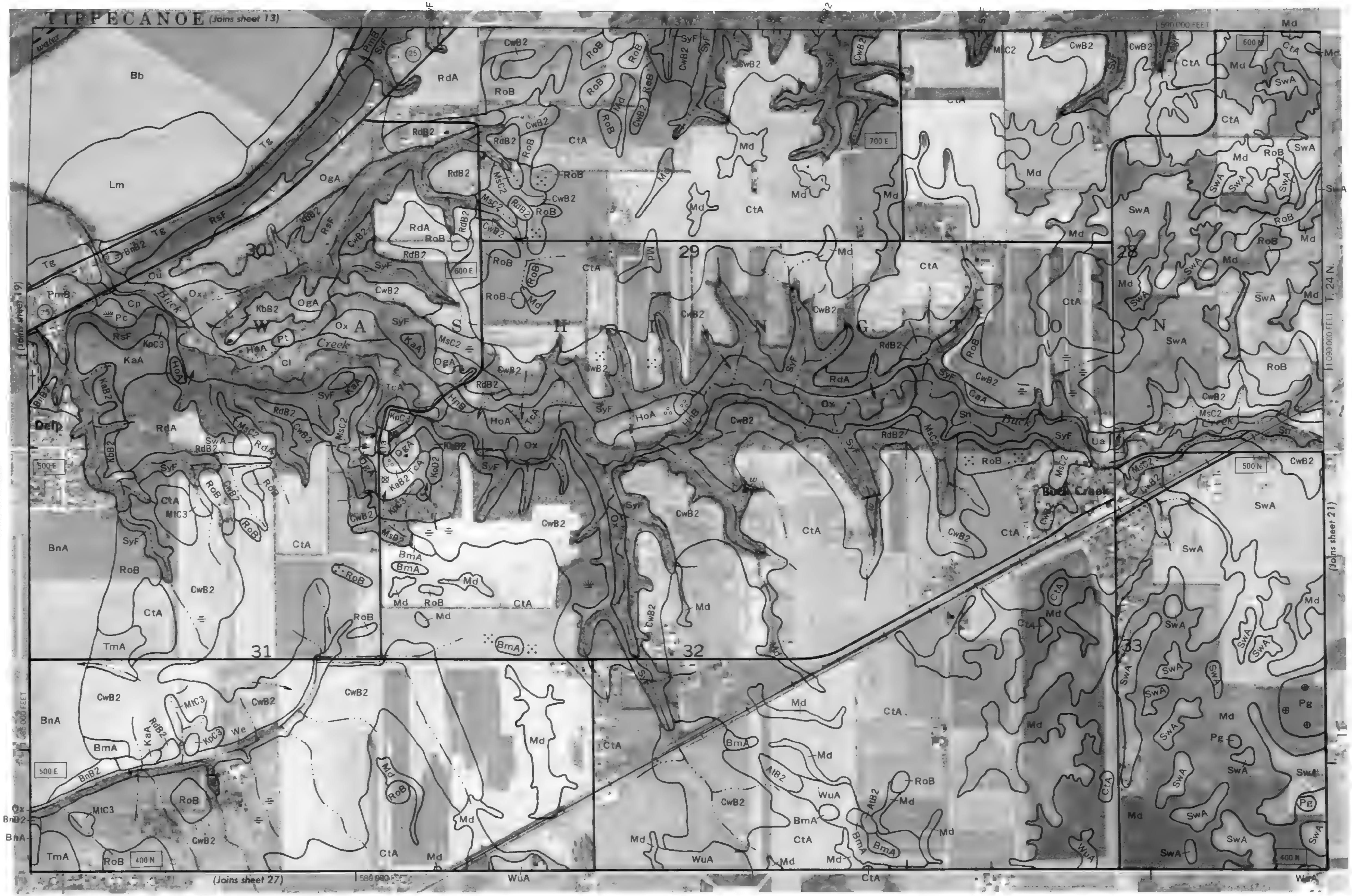
20

N

1 Mile

5 000 Feet

Scale 1:15 840



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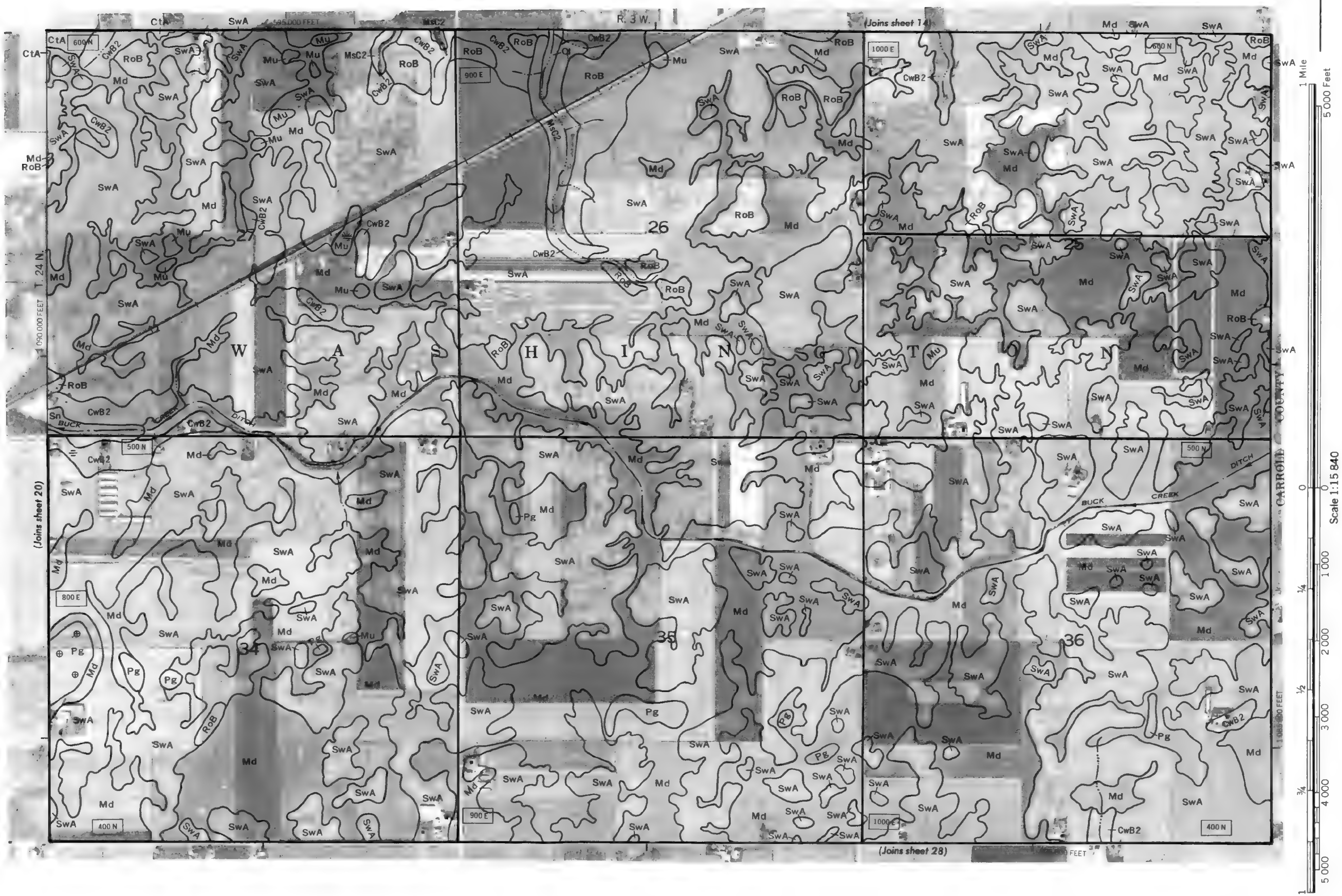

TIPPECANOE COUNTY, INDIANA NO. 21

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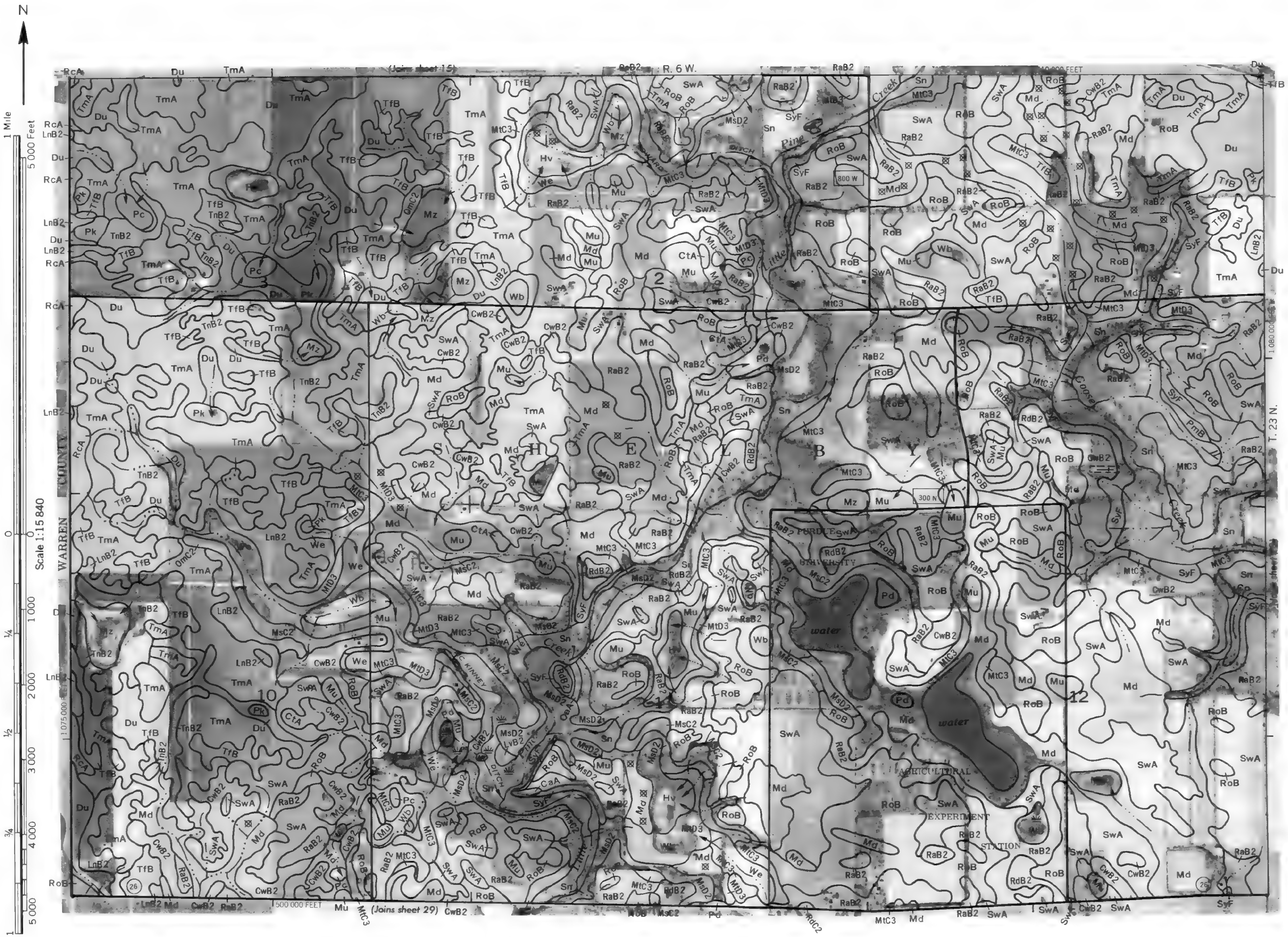

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TIPPECANOE COUNTY, INDIANA NO. 23

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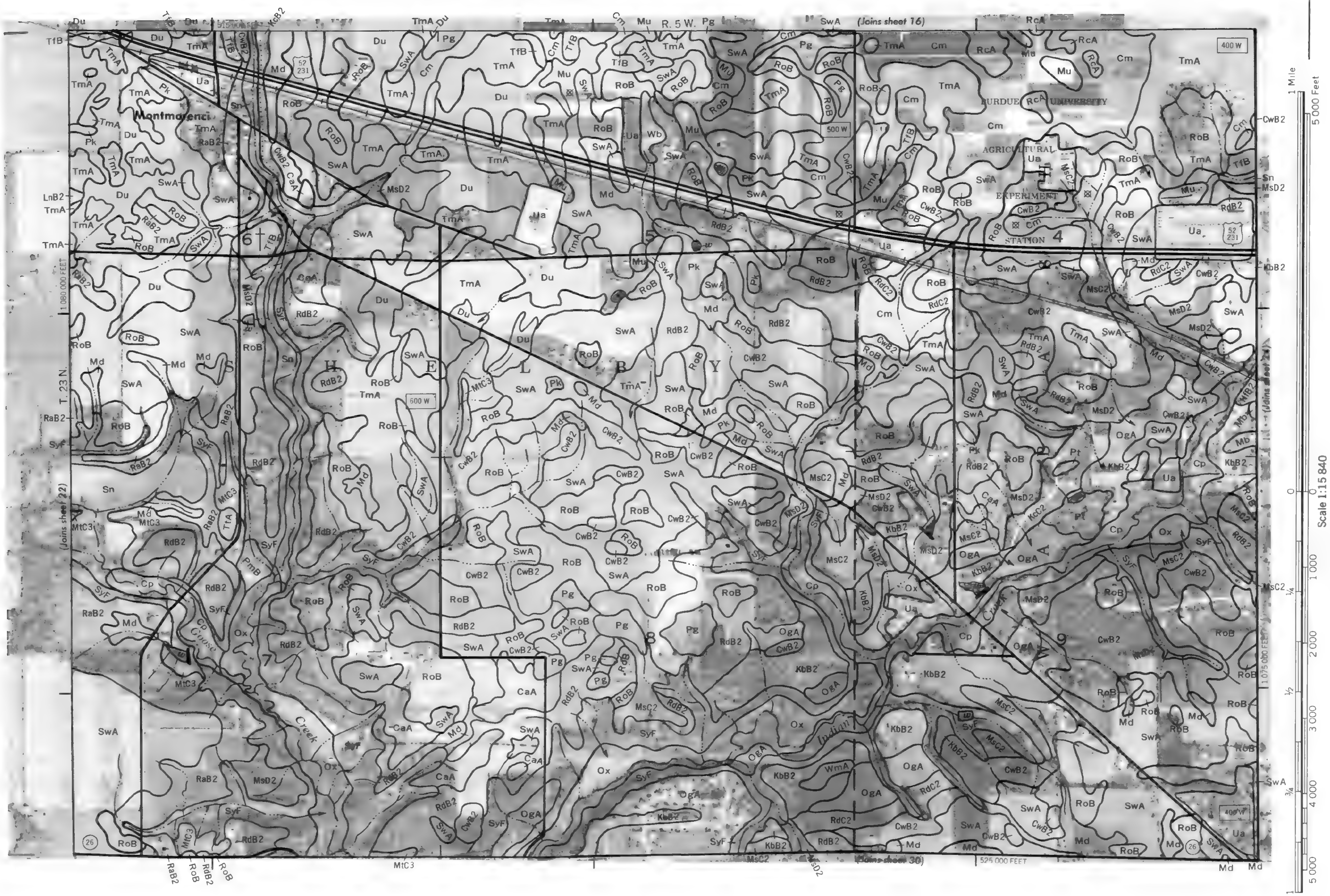

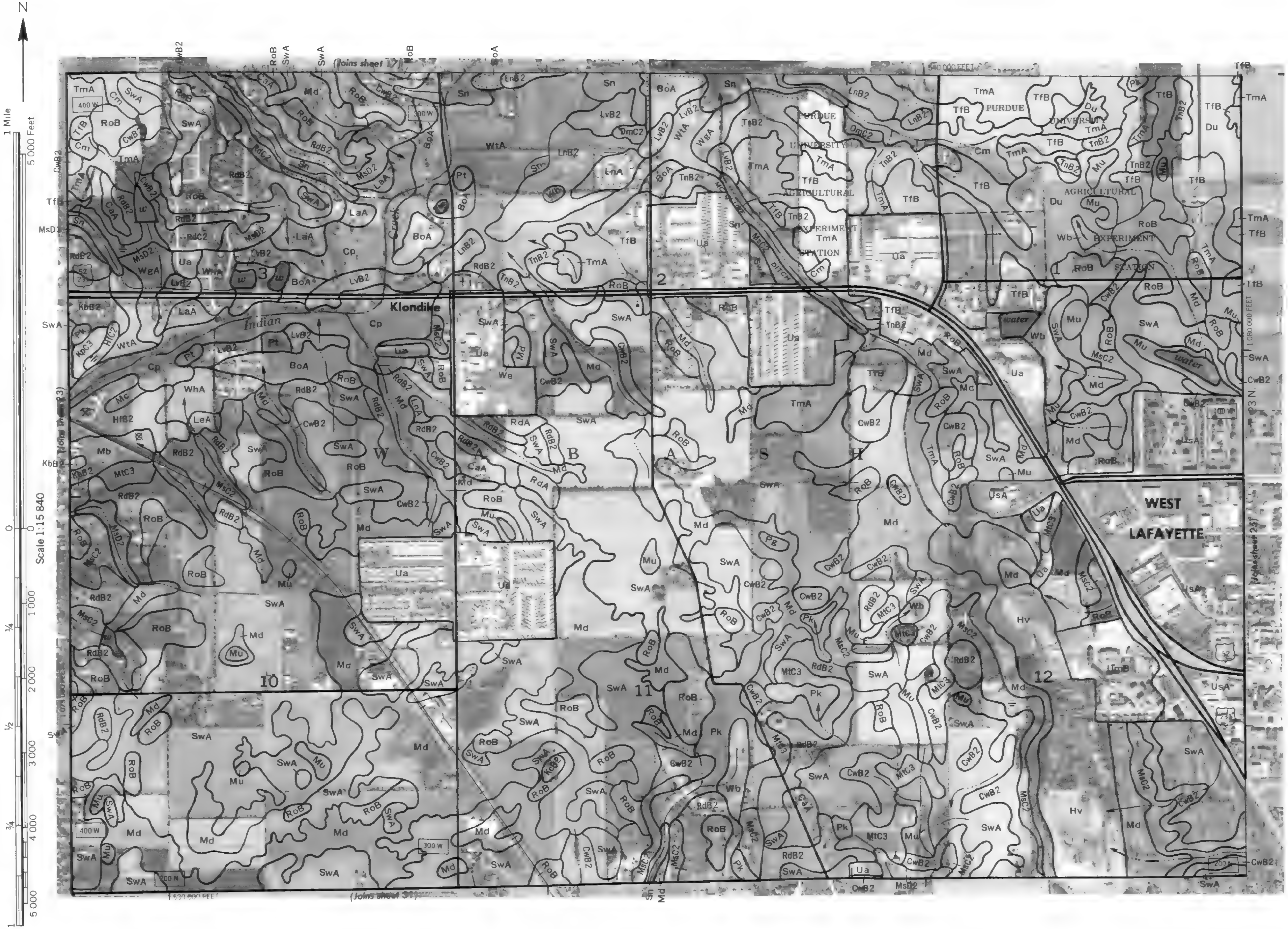

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TIPPECANOE COUNTY, INDIANA NO. 25

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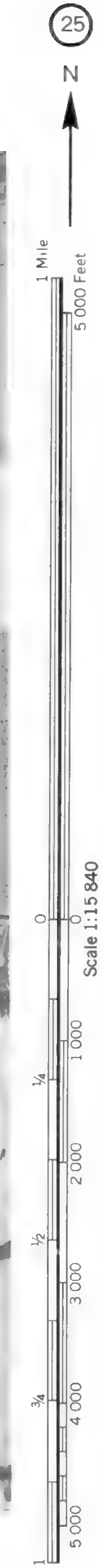

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TIPPECANOE COUNTY, INDIANA NO. 27

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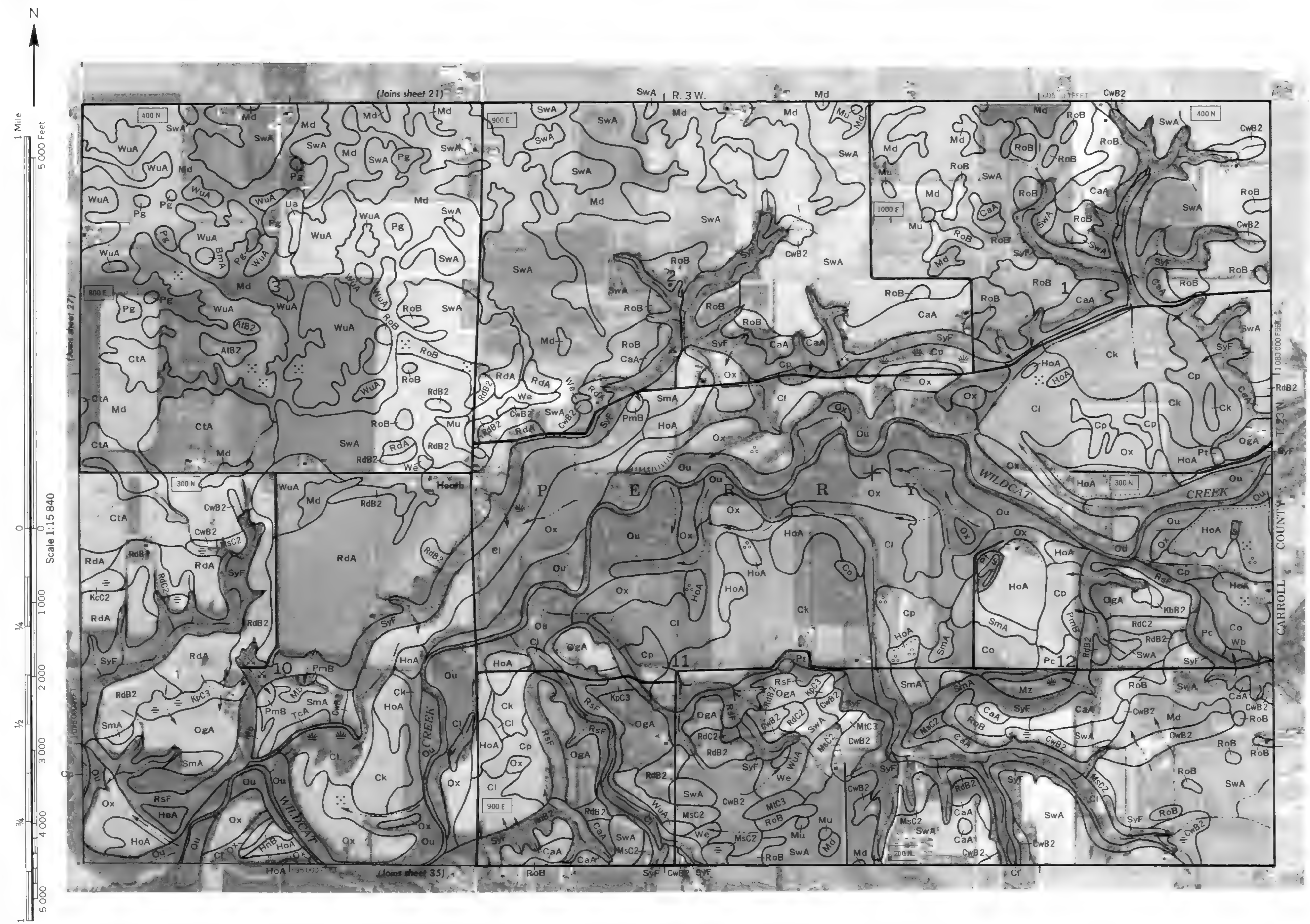
28



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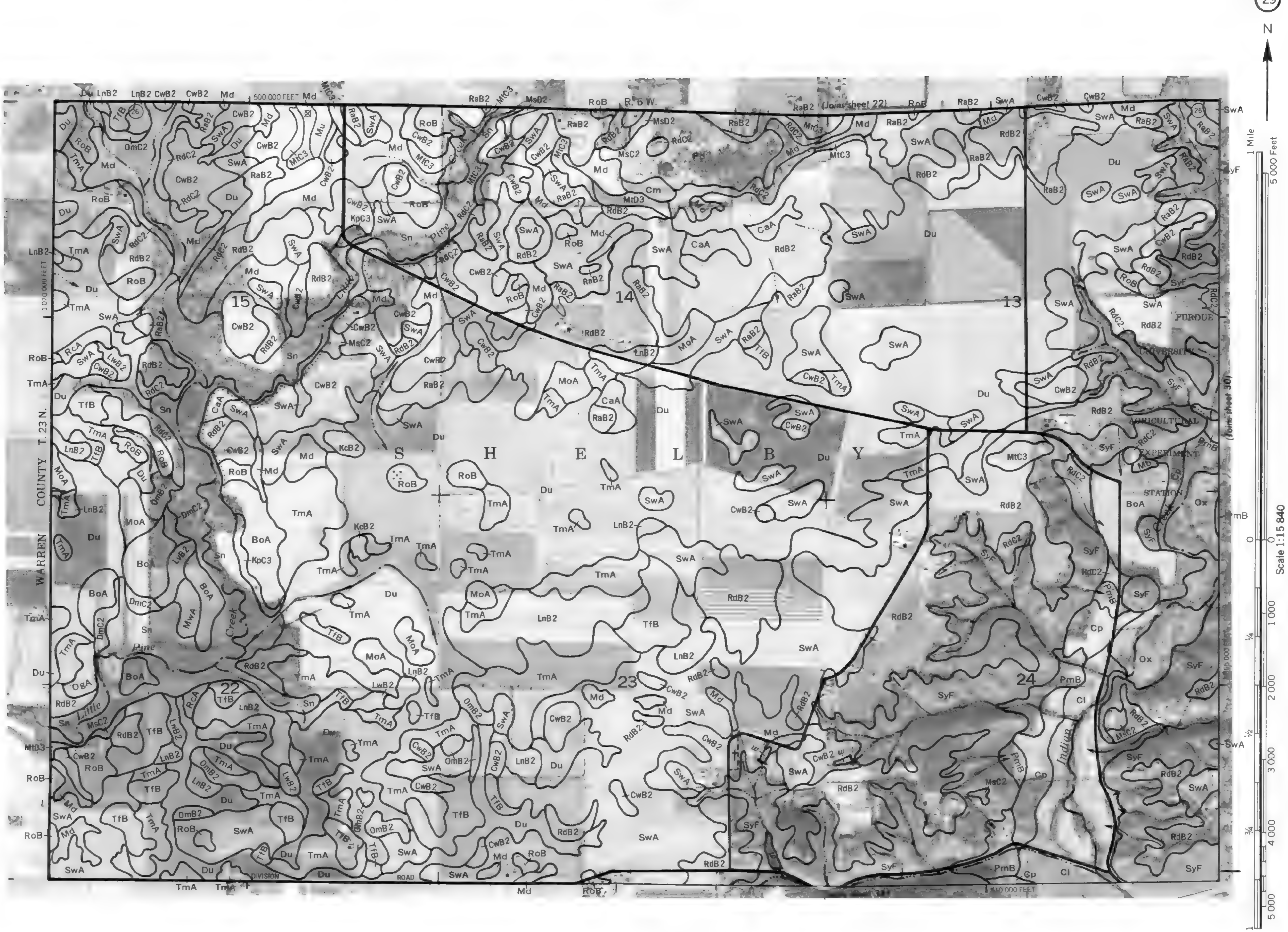
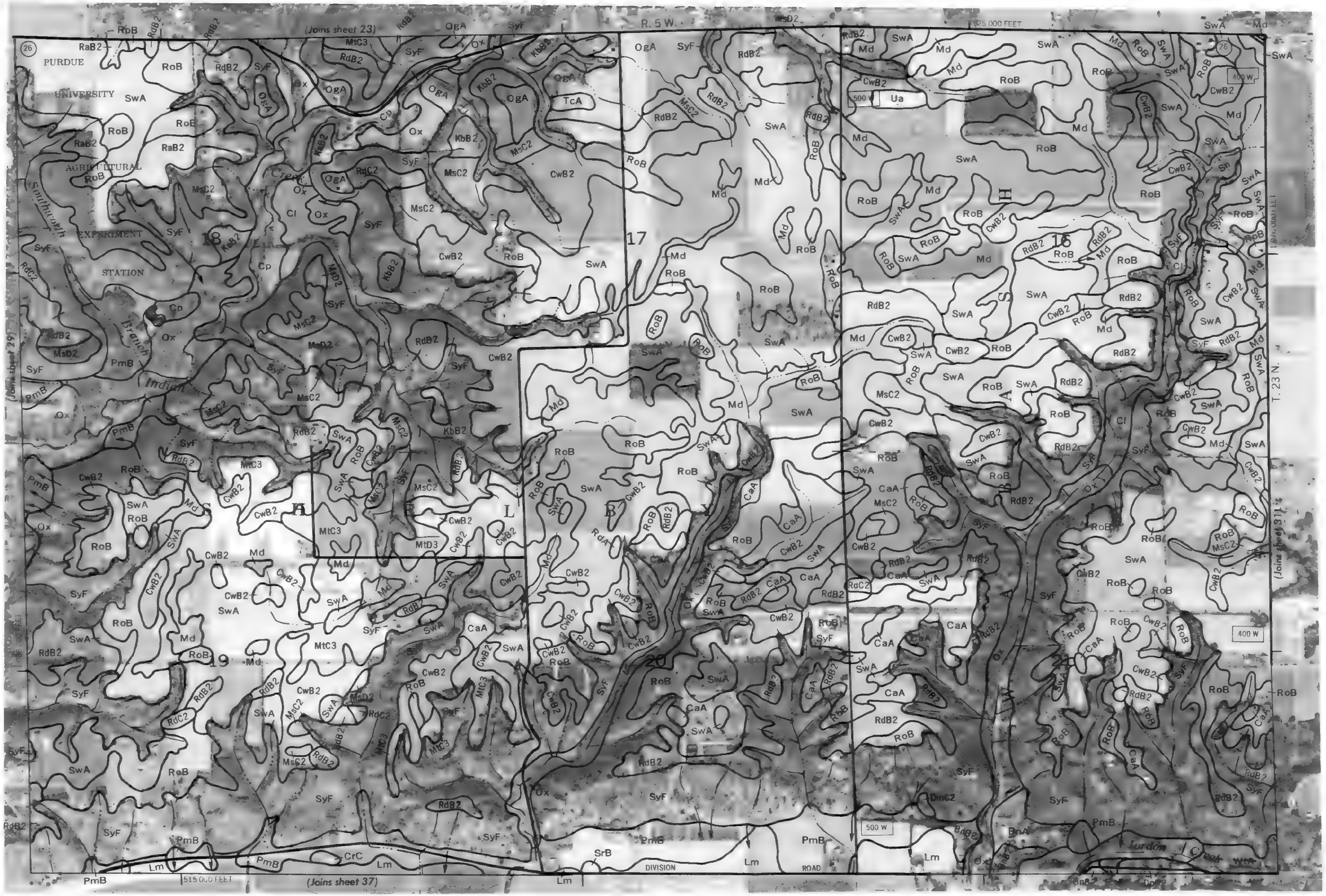
TIPPECANOE COUNTY, INDIANA NO. 28



TIPPECANOE COUNTY, INDIANA NO. 29

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

TIPPECANOE COUNTY, INDIANA — SHEET NUMBER 30



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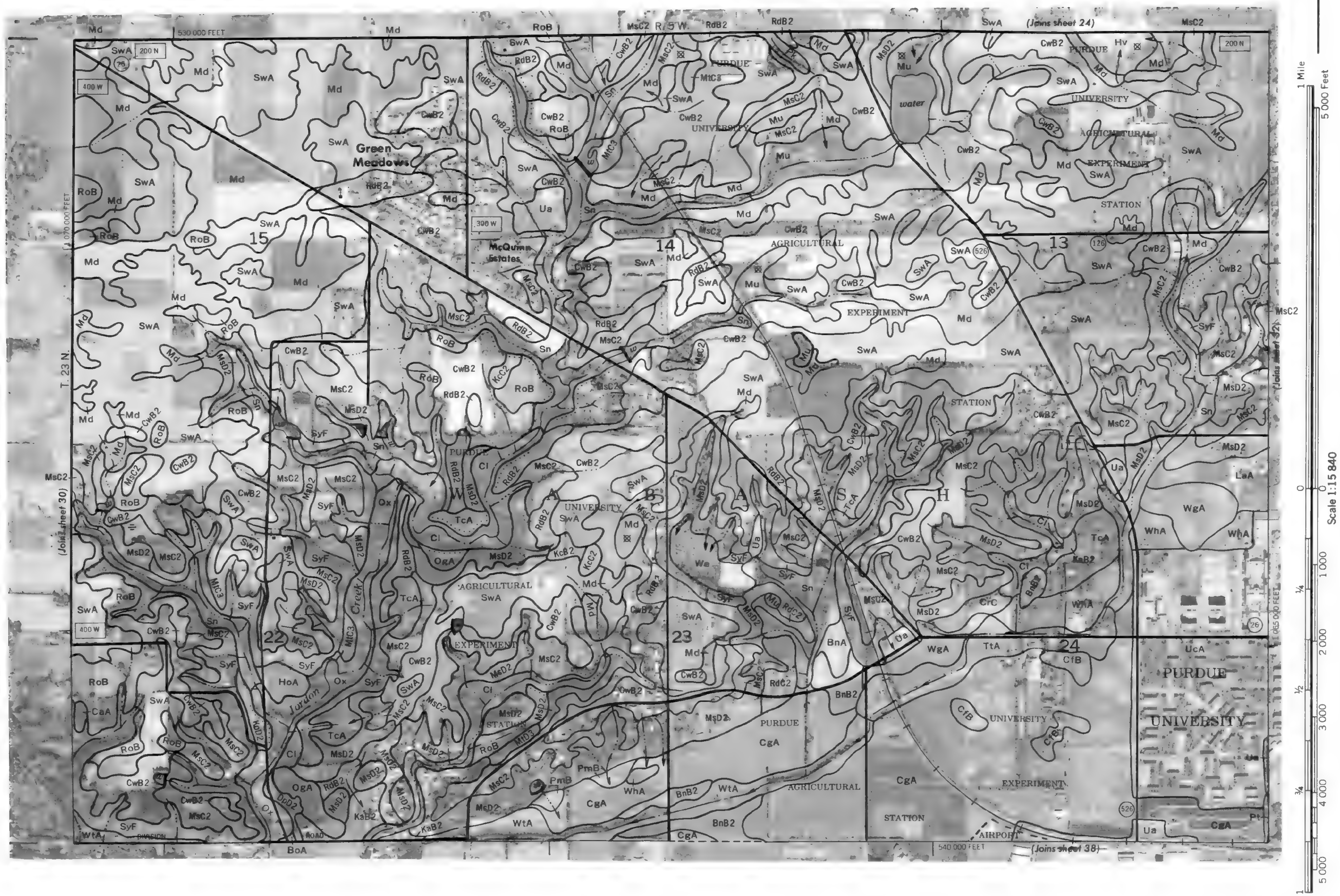
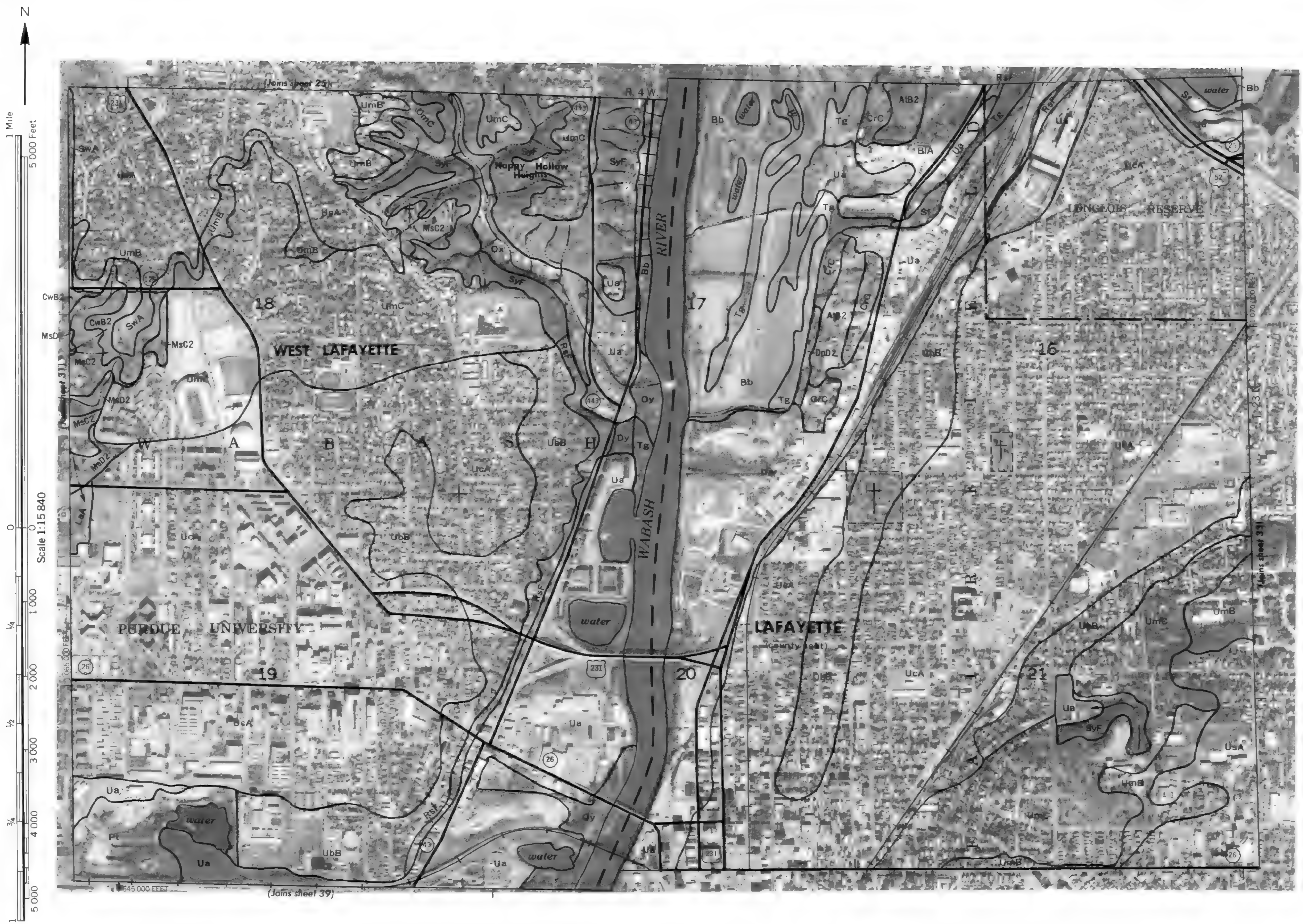


TIPPECANOE COUNTY, INDIANA NO. 31

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned

32

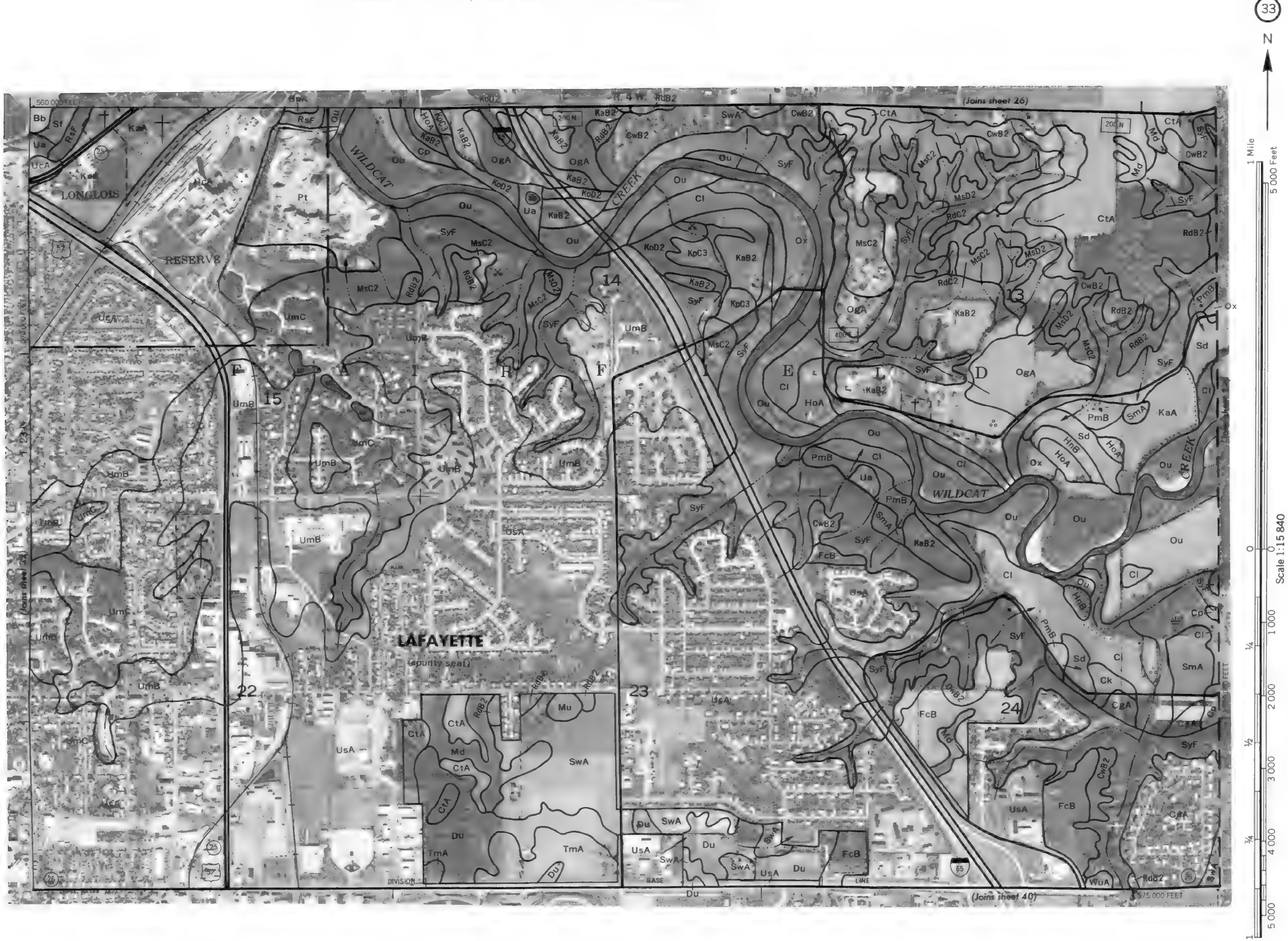


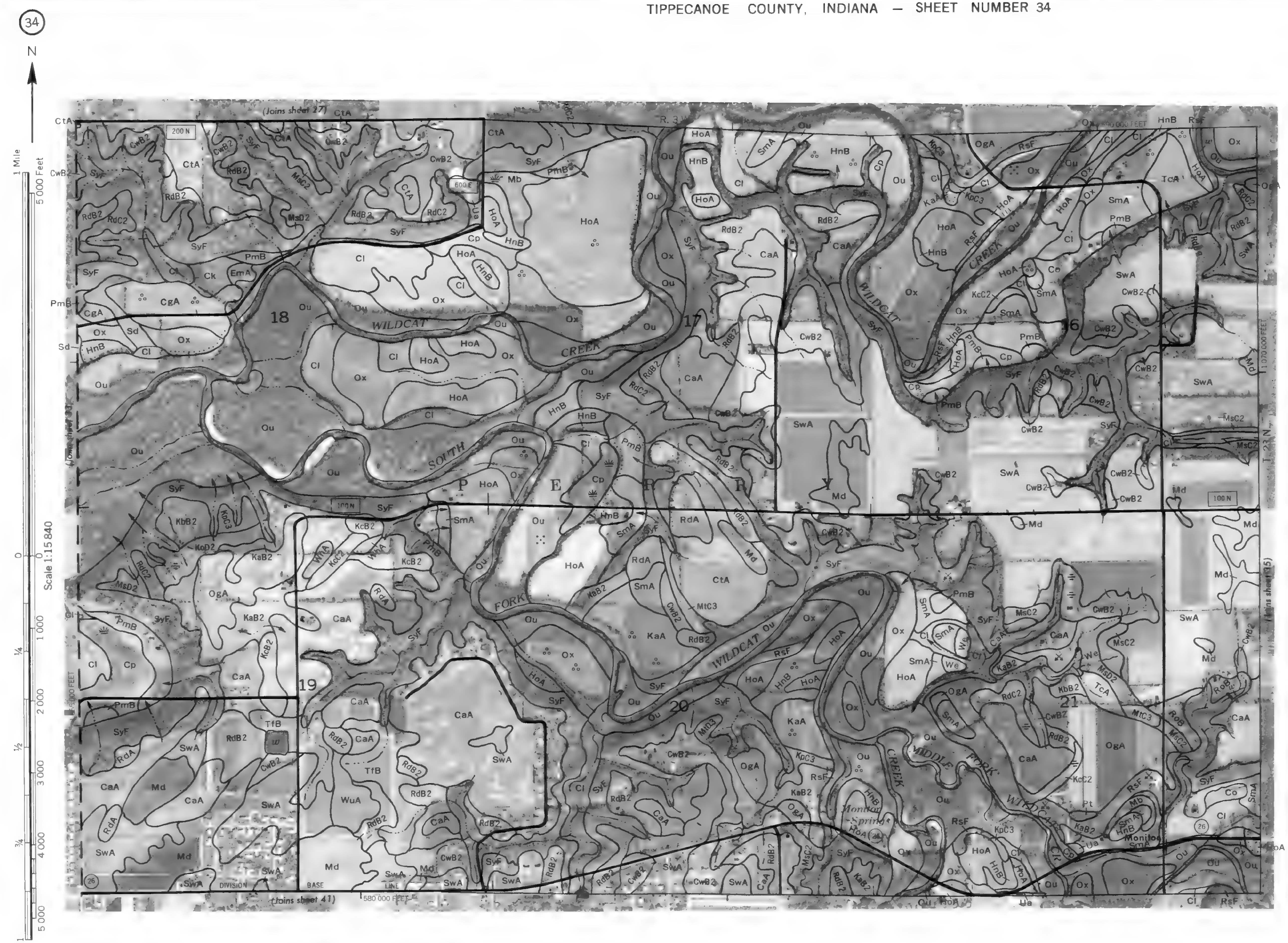
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

TIPPECANOE COUNTY, INDIANA NO. 32

TIPPECANOE COUNTY, INDIANA NO. 33

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.





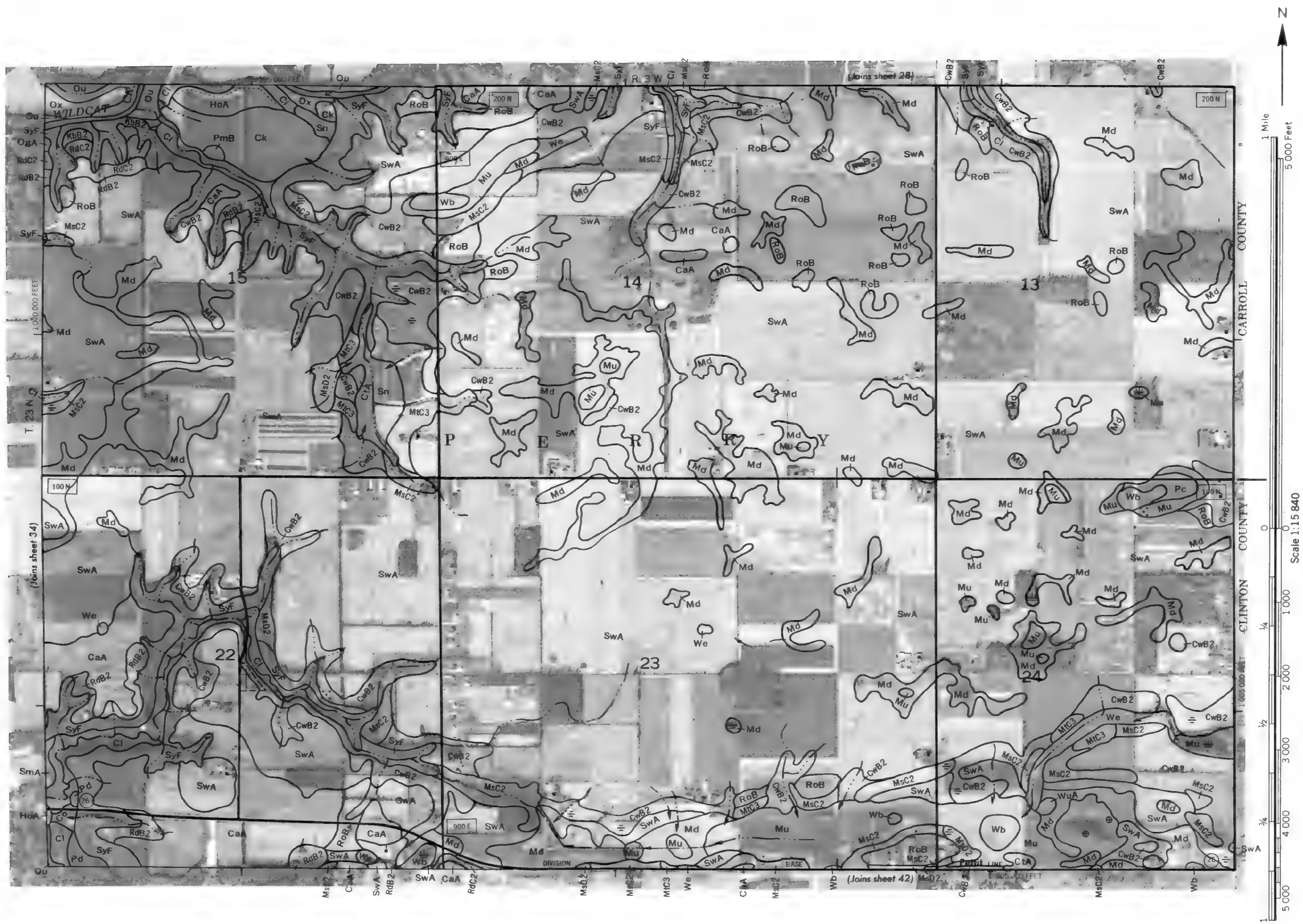
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

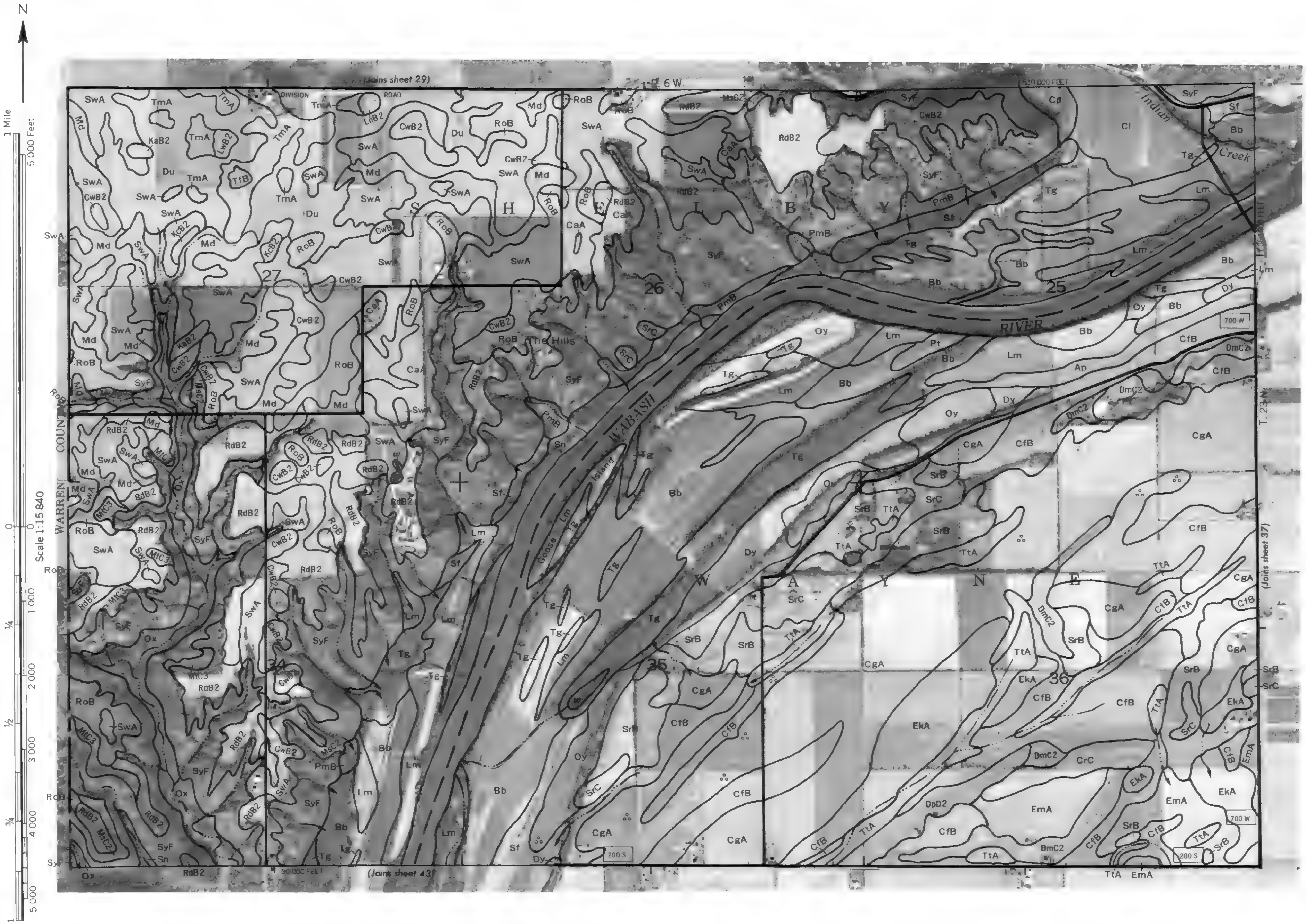
TIPPECANOE COUNTY, INDIANA NO. 34

35

TIPPECANOE COUNTY, INDIANA NO. 35

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

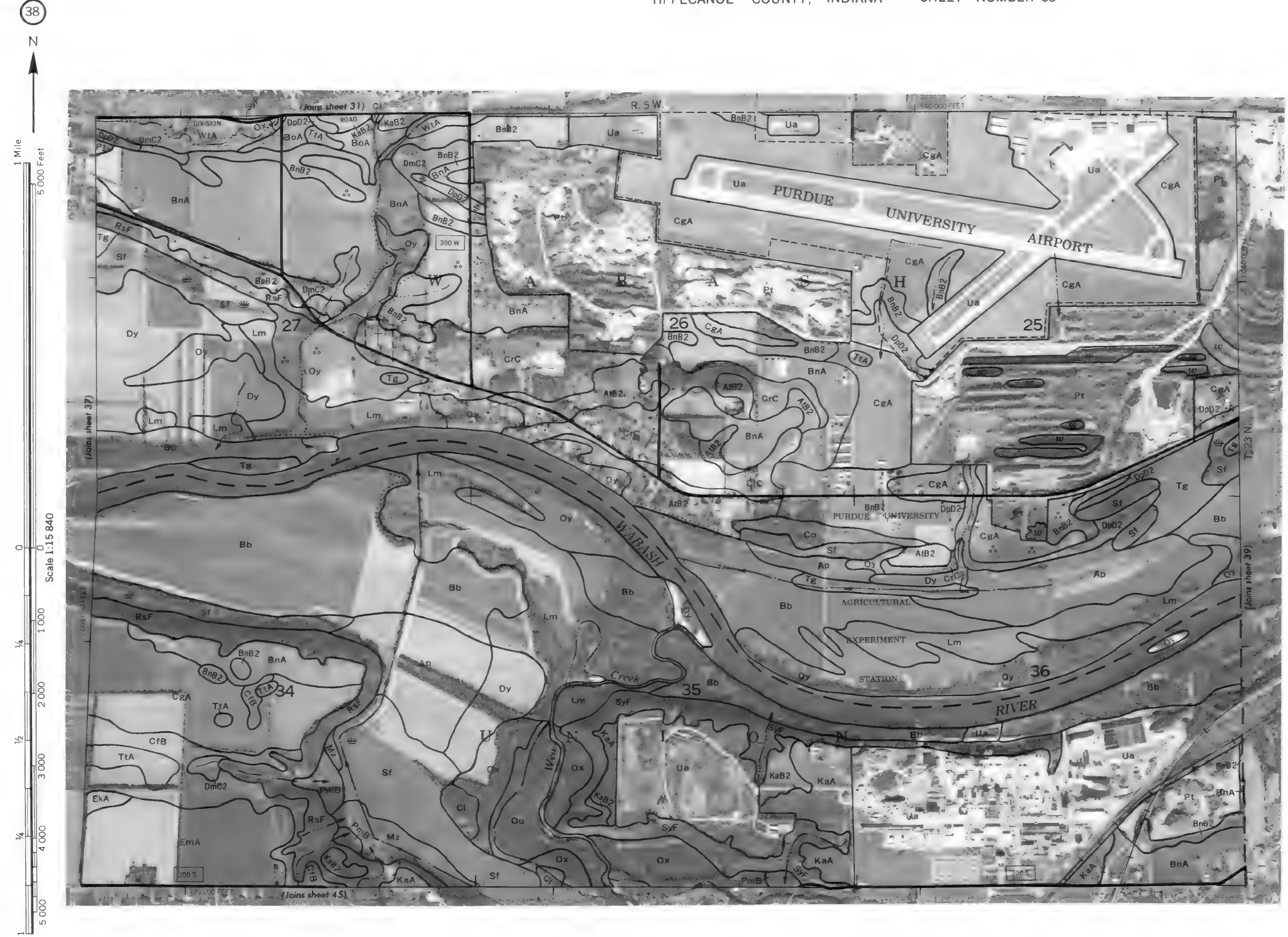




This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

TIPPECANOE COUNTY, INDIANA NO. 37

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

39

TIPPECANOE COUNTY, INDIANA NO. 39

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

1 Mile

5 000 Feet

Scale 1:15 840

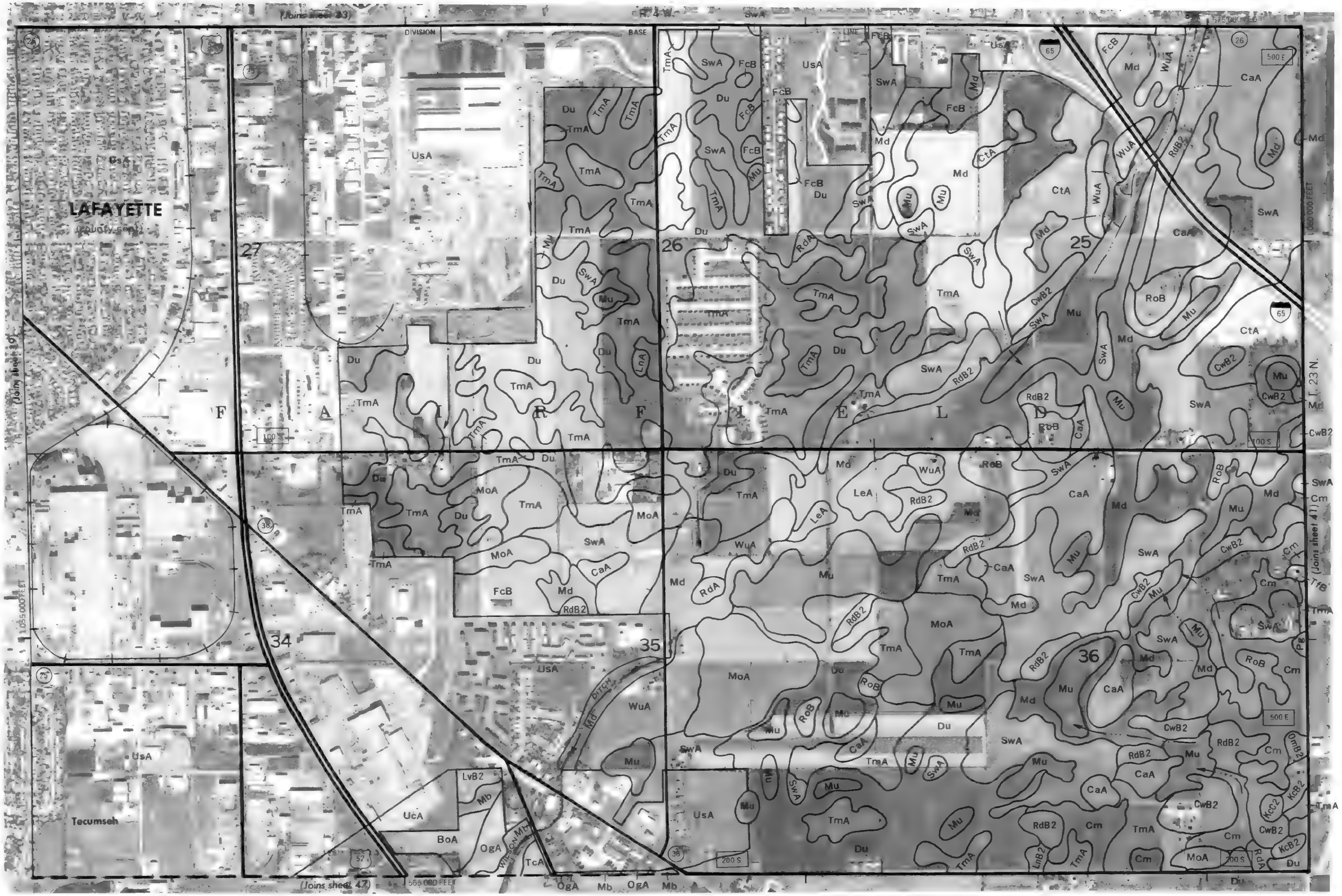
0 | 1000 | 2000 | 3000 | 4000 | 5000

0 | ¼ | ½ | ¾ | 1

TIPPECANOE COUNTY, INDIANA — SHEET NUMBER 40

N

1 Mile
5 000 Feet
Scale 1:15 840
0 ¼ ½ ¾ 1
0 1000 2000 3000 4000 5000

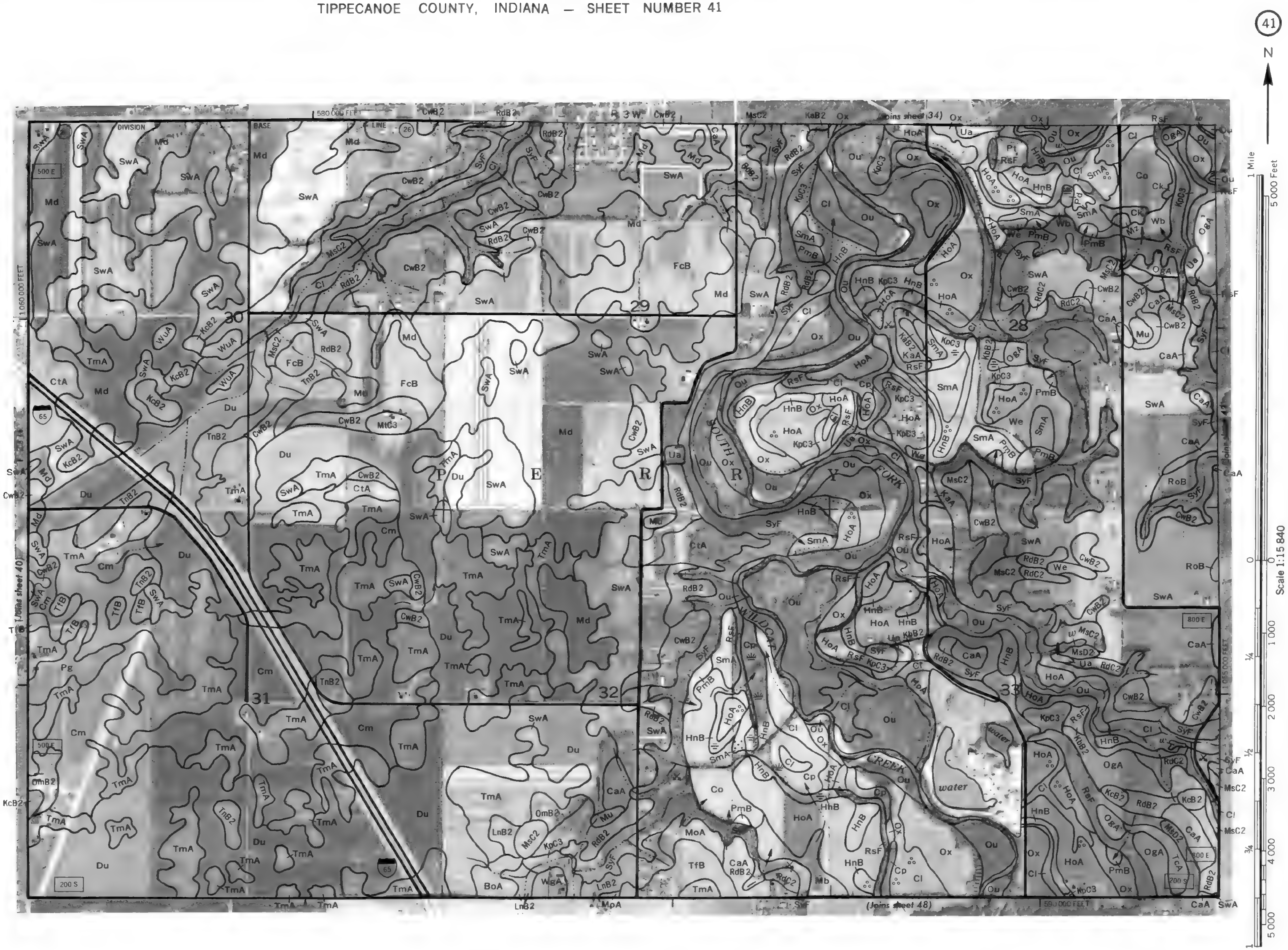


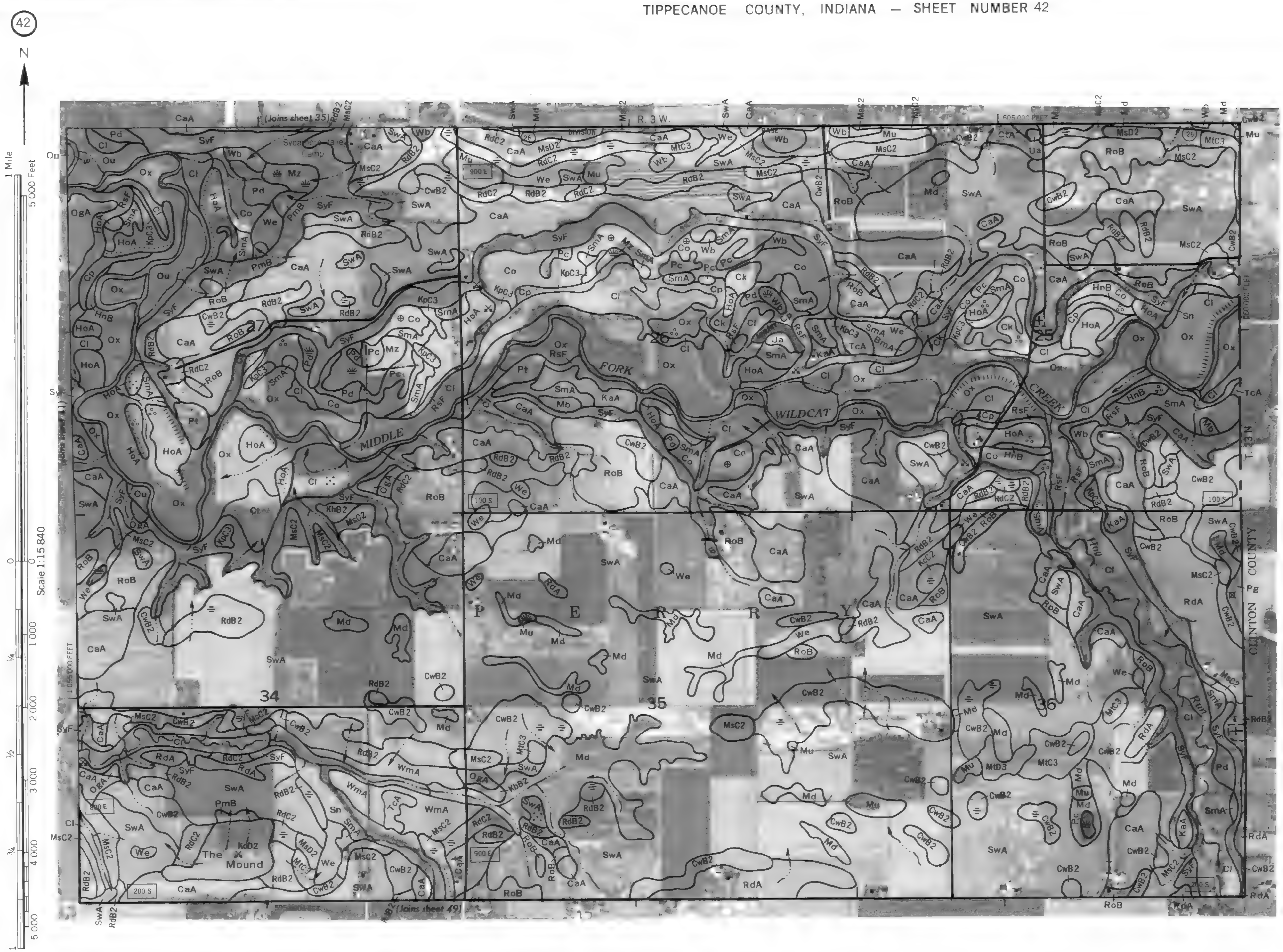
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

TIPPECANOE COUNTY, INDIANA NO. 40

TIPPECANOE COUNTY, INDIANA NO. 41

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

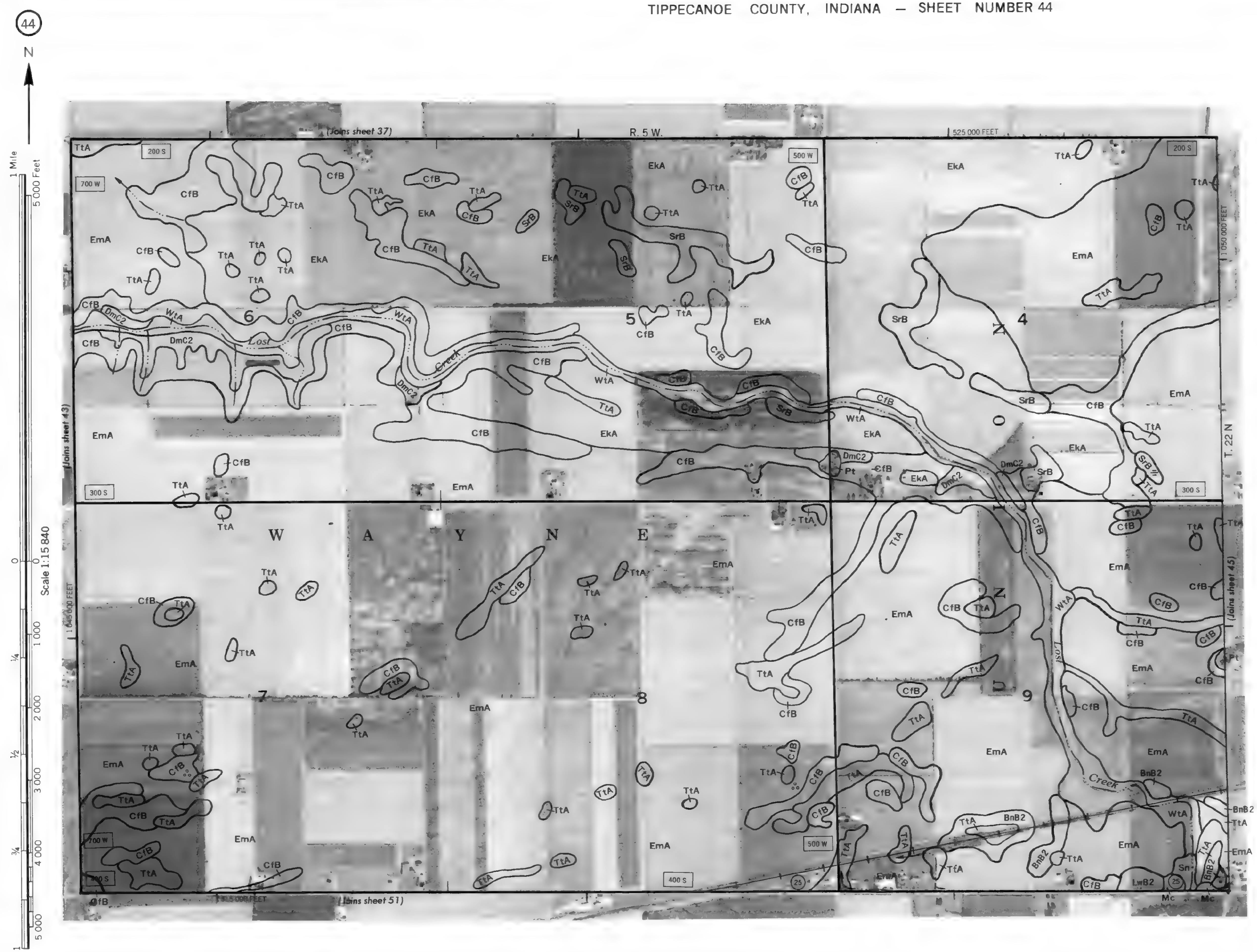




This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

TIPPECANOE COUNTY, INDIANA NO. 43

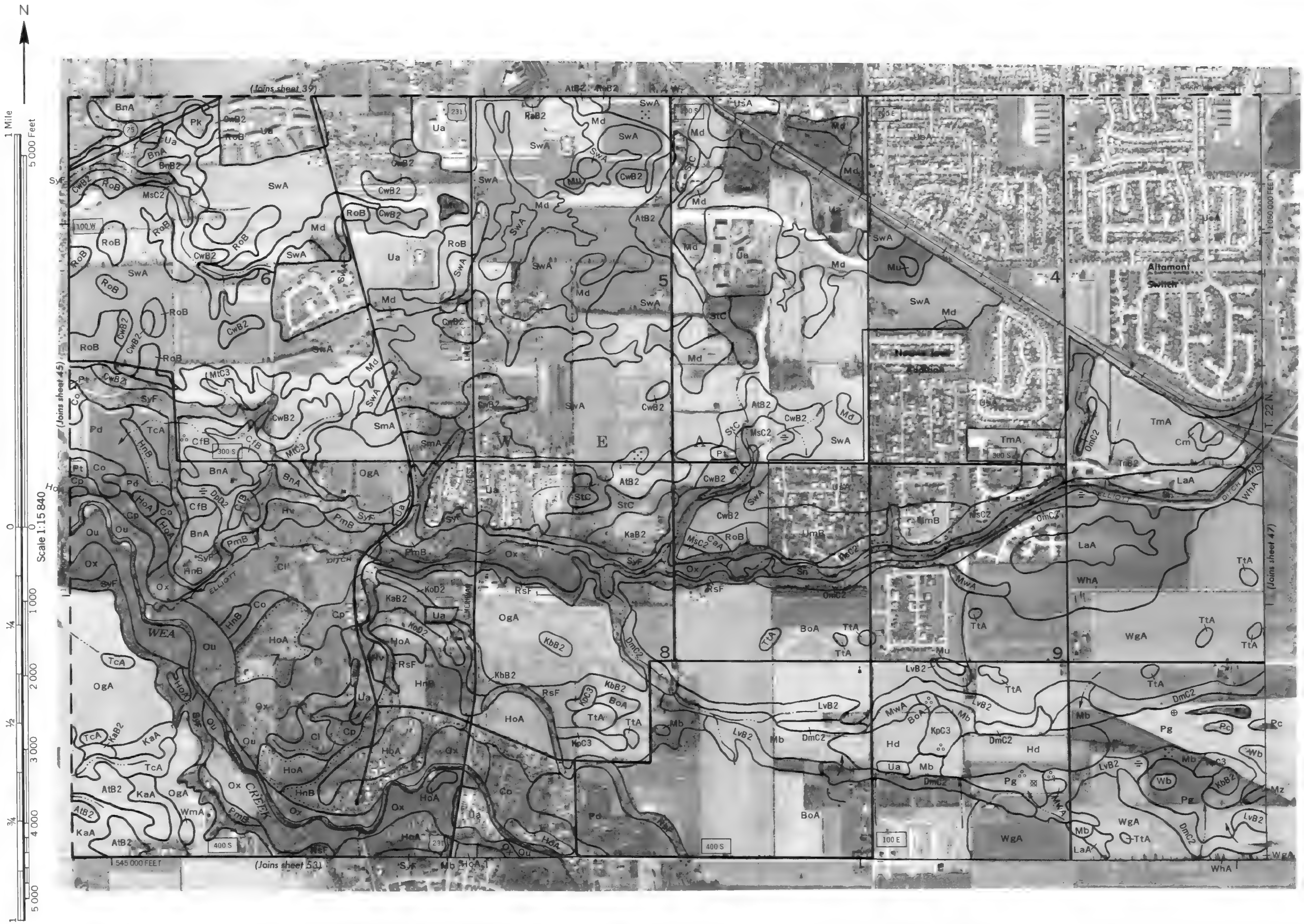
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

TIPPECANOE COUNTY, INDIANA NO. 45

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

47

N

1 Mile

5 000 Feet

Scale 1:15 840

0 ¼ ½ ¾ 1

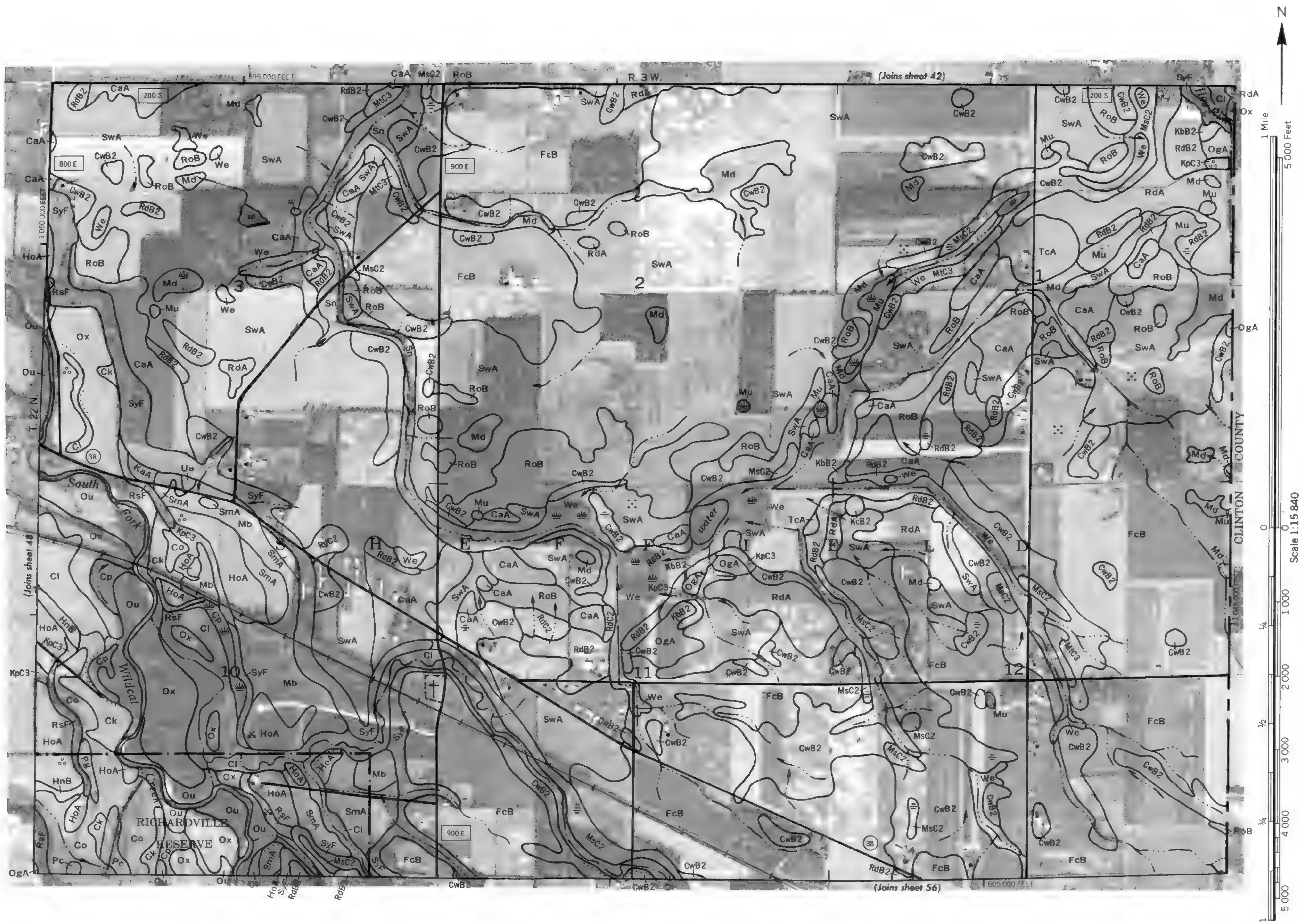
0 1 000 2 000 3 000 4 000 5 000

TIPPECANOE COUNTY, INDIANA NO. 47

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

48

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



TIPPECANOE COUNTY, INDIANA NO. 49

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned

50

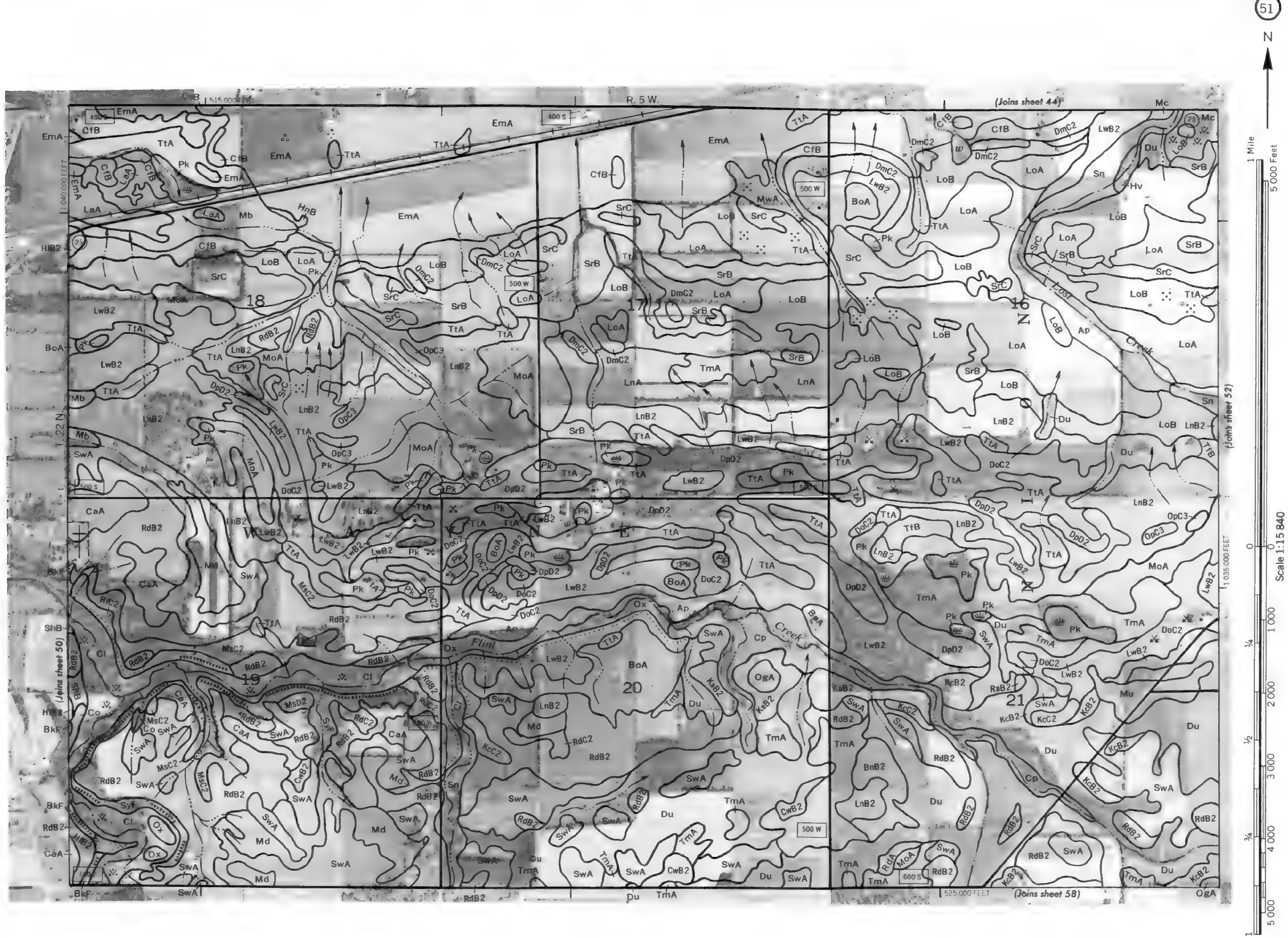
N

1 Mile

5 000 Feet

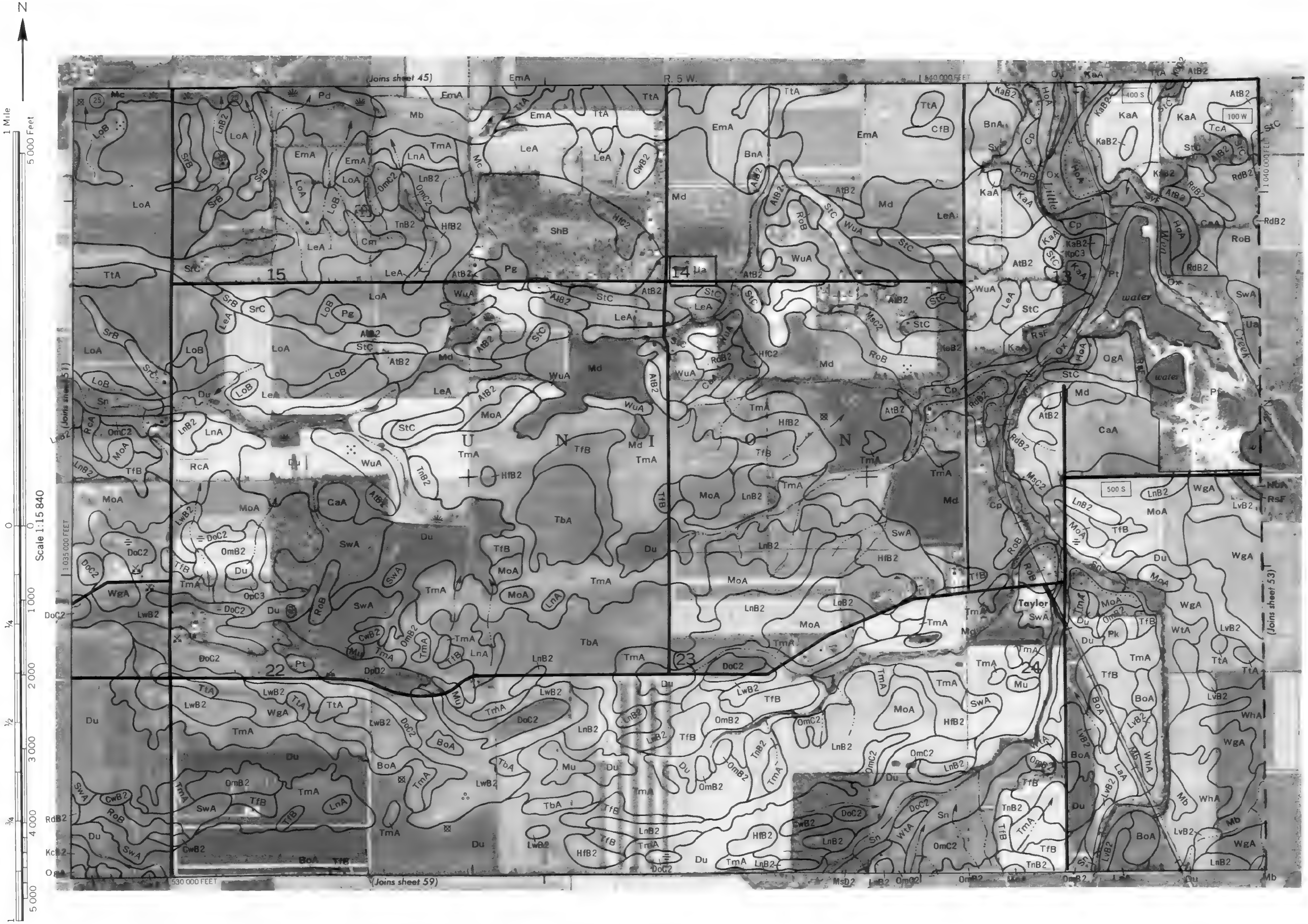
Scale 1:15 840

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned

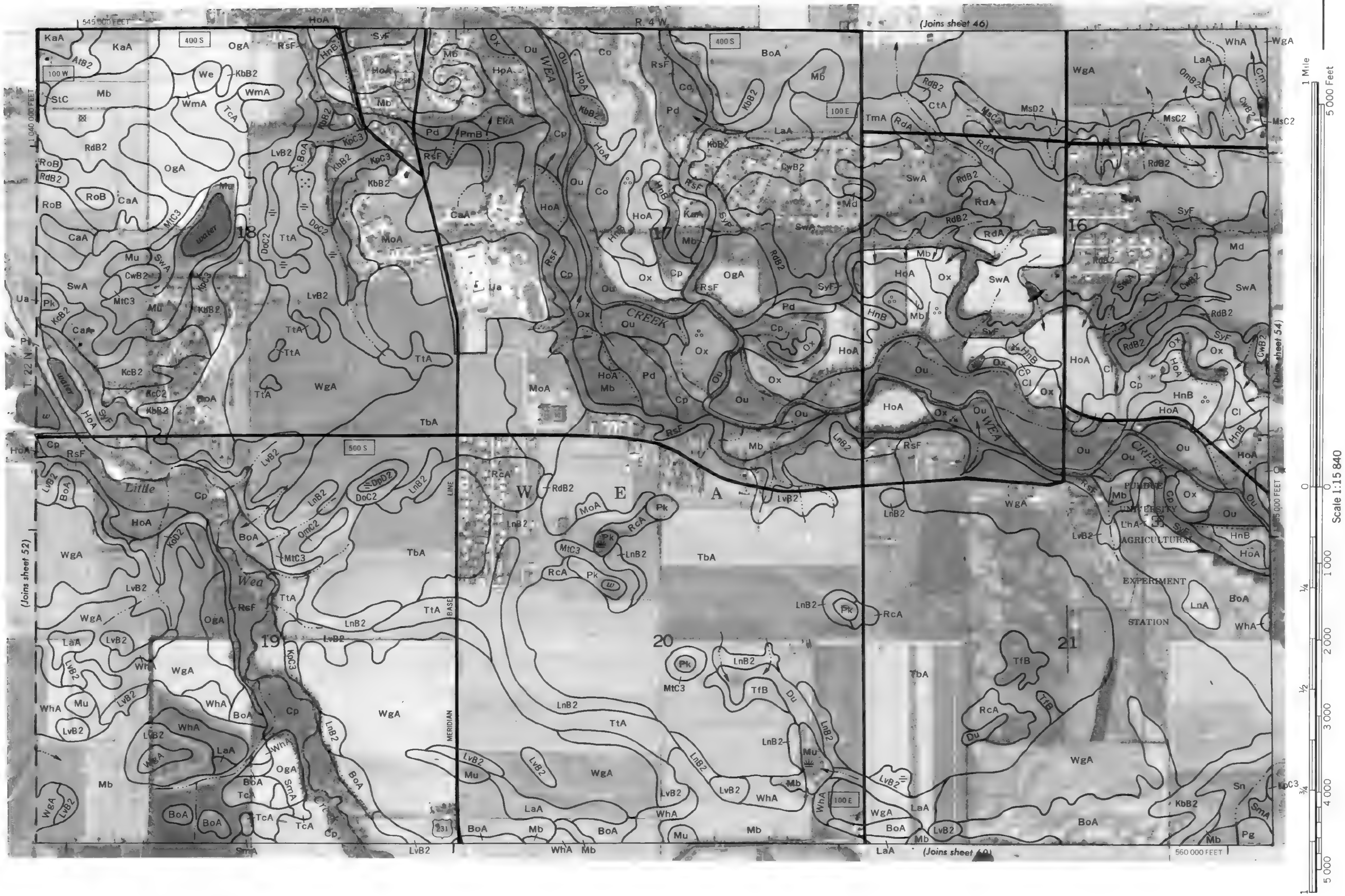


TIPPECANOE COUNTY, INDIANA NO. 51

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned

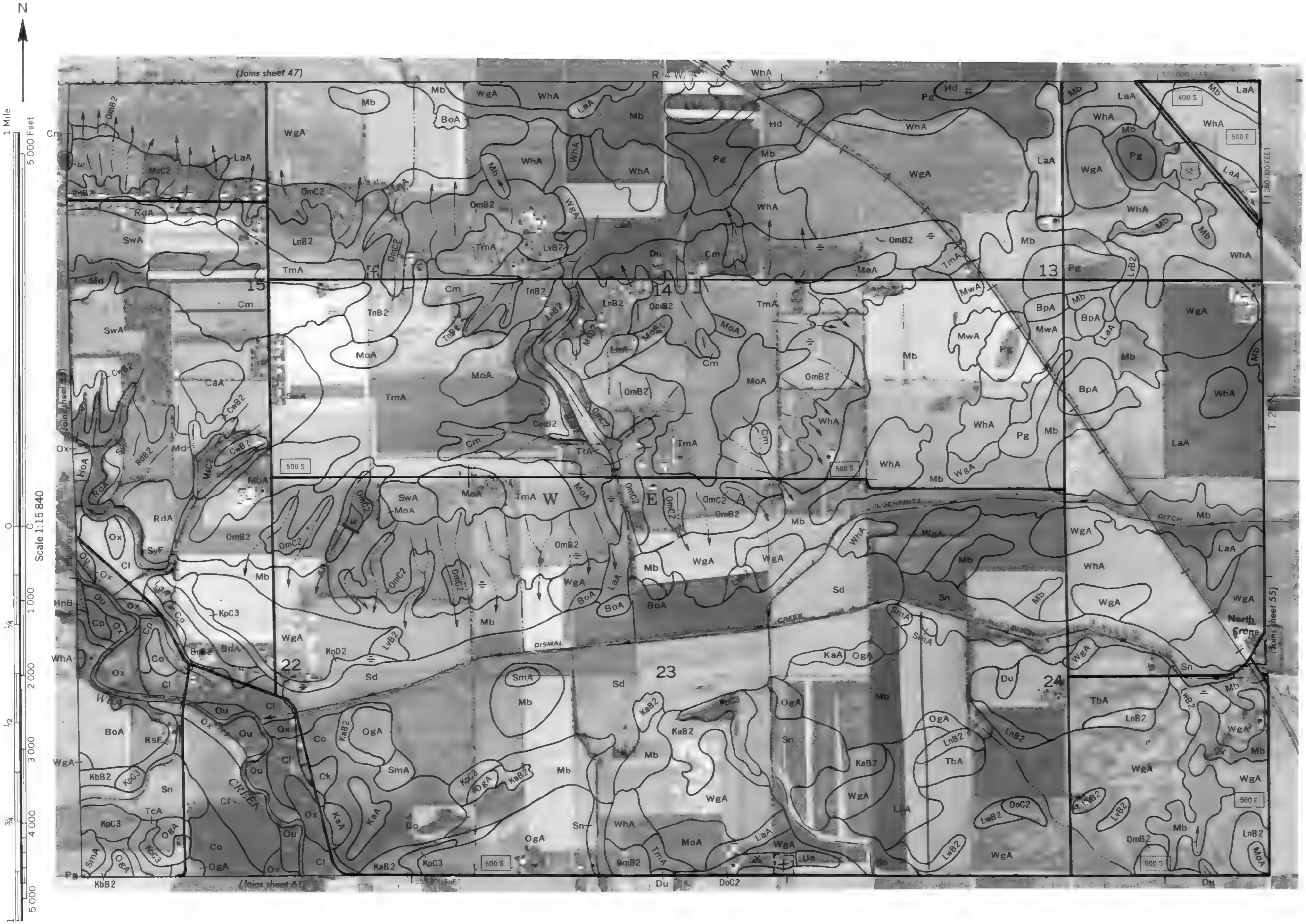


This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



TIPPECANOE COUNTY, INDIANA NO. 53

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned

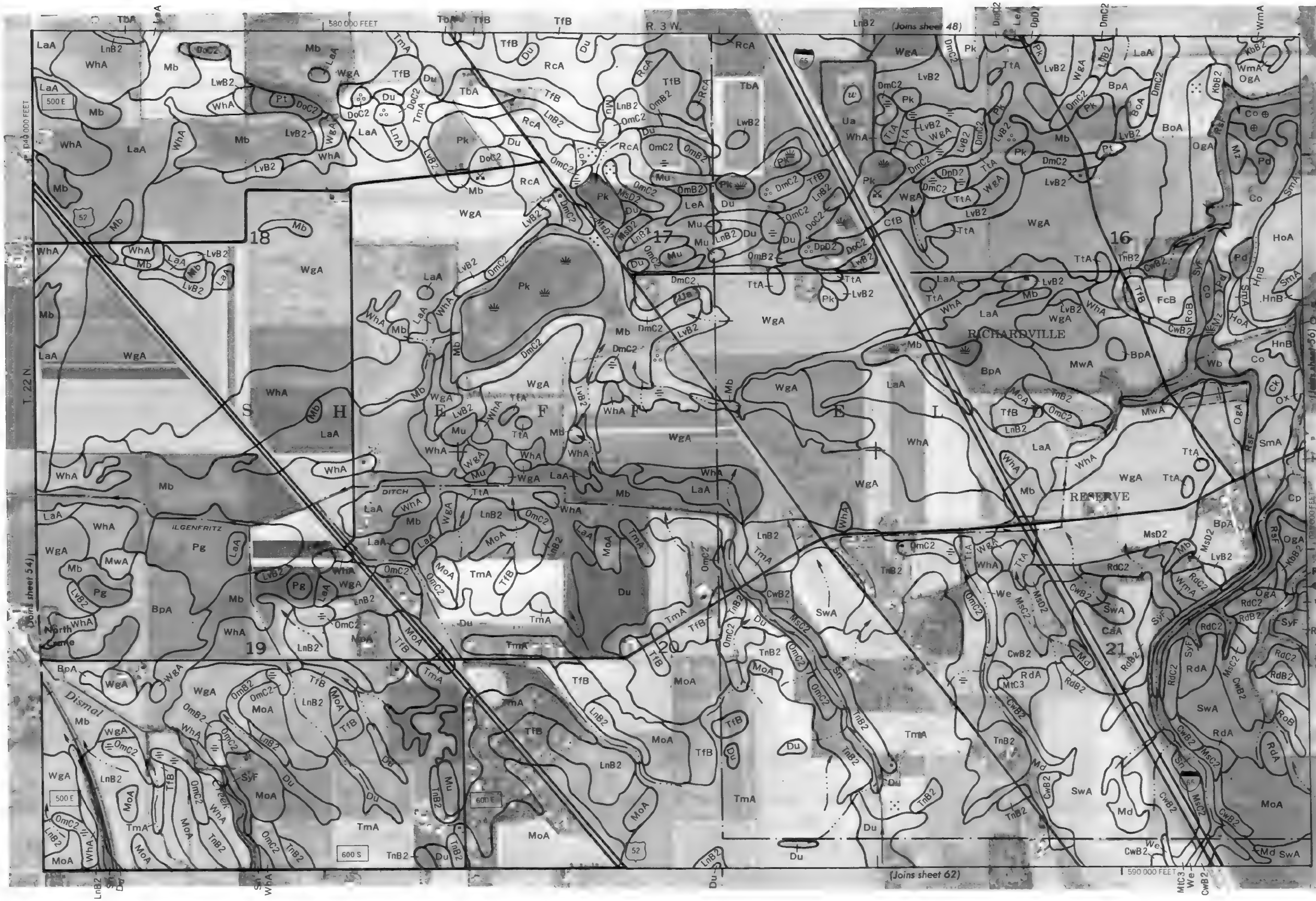


This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

55

TIPPECANOE COUNTY, INDIANA NO. 55

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

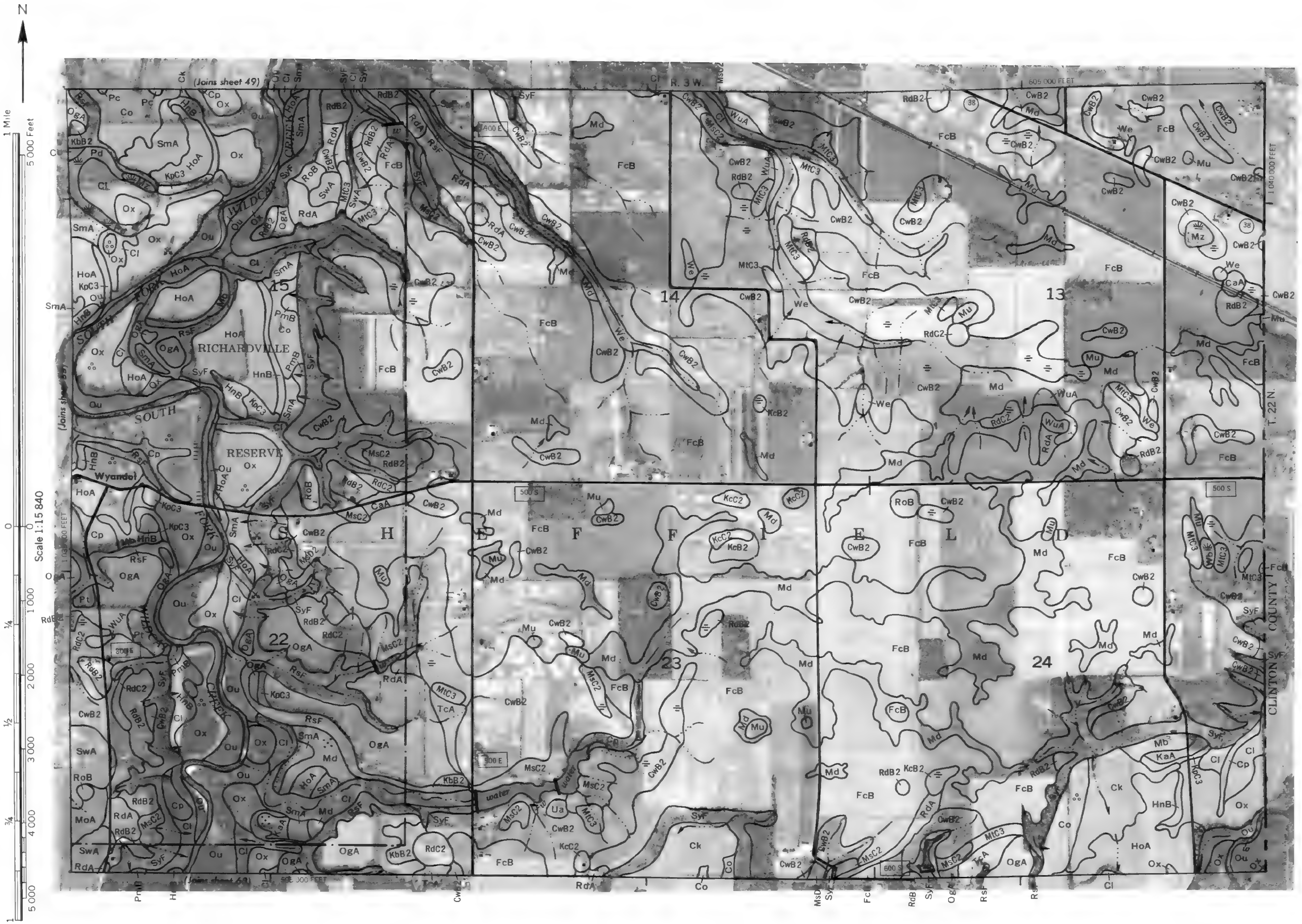


N

1 Mile

5 000 Feet

Scale 1:15 840



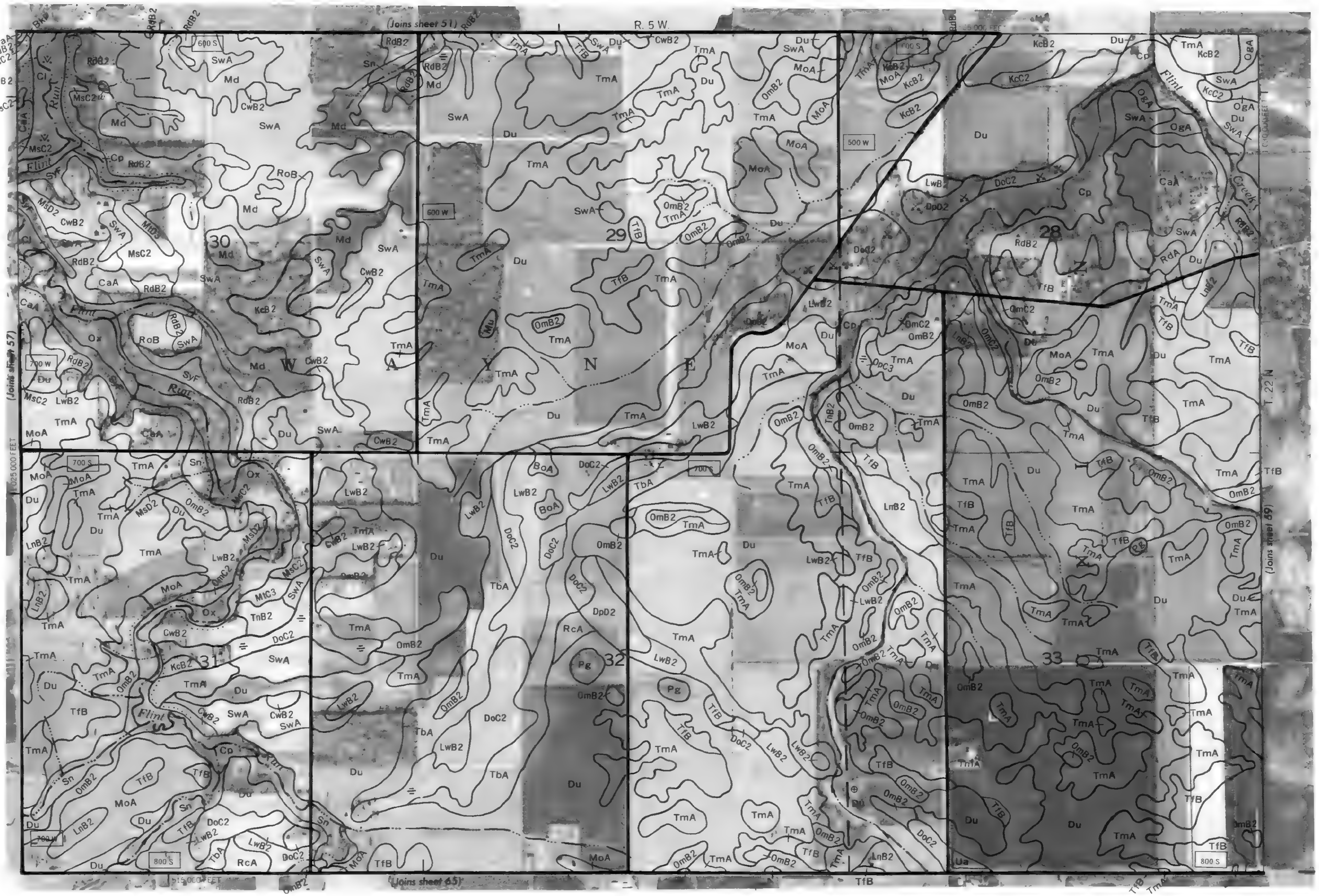
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

TIPPECANOE COUNTY, INDIANA NO. 57

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

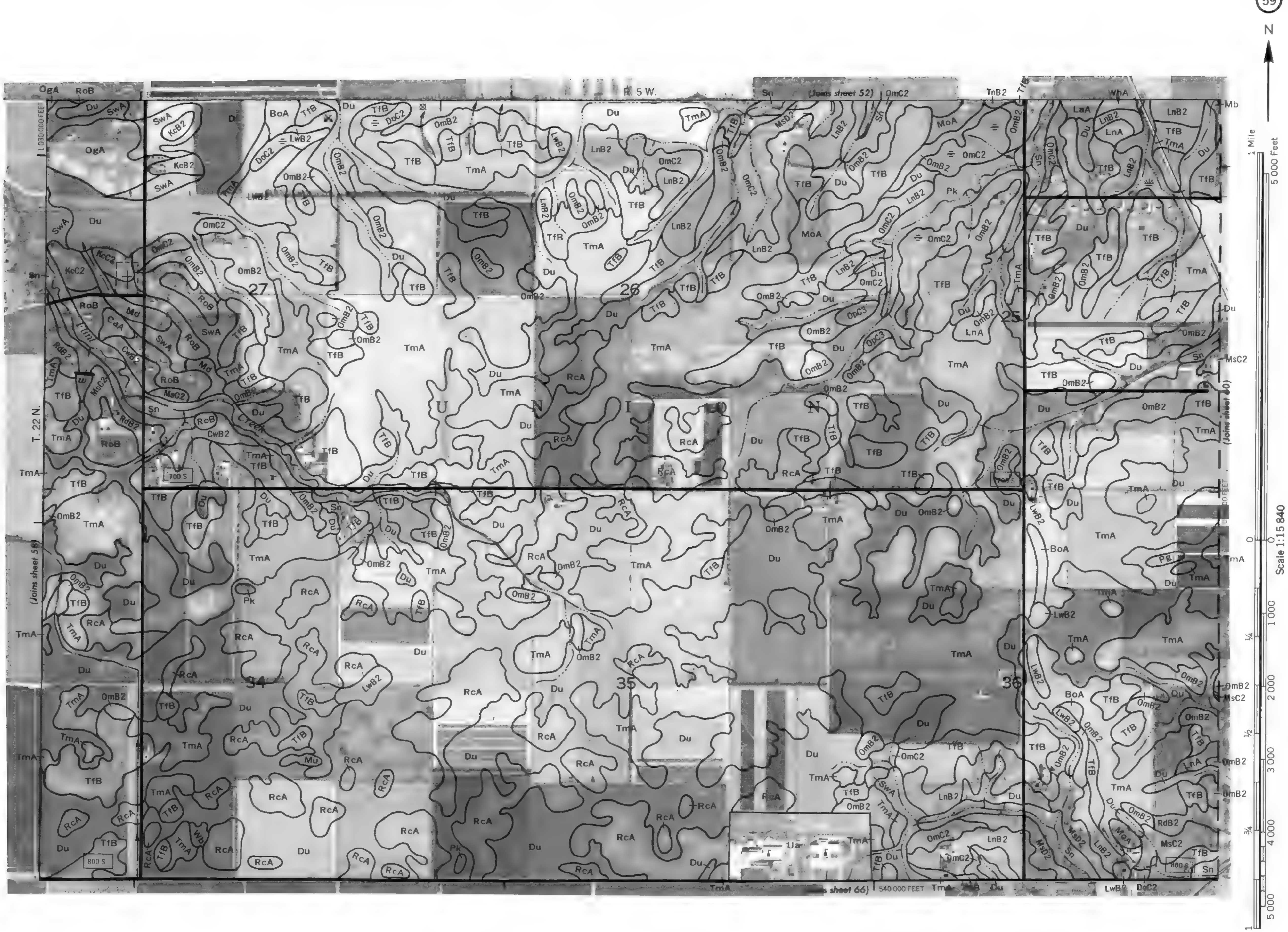
1 Mile
5 000 Feet
0
Scale 1:15 840
1 000
1/4
2 000
1/2
3 000
3/4
4 000
5 000
1

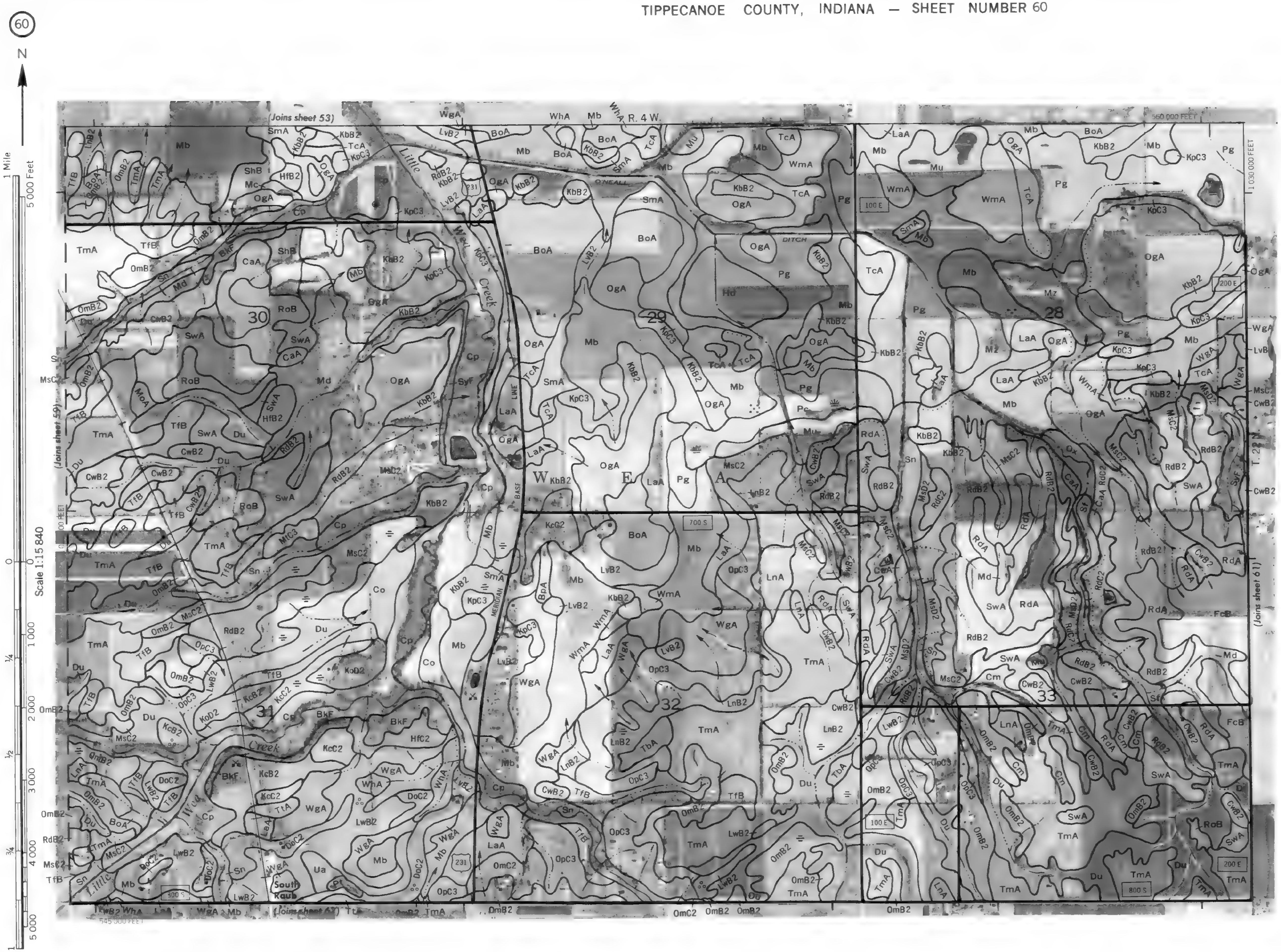


This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

TIPPECANOE COUNTY, INDIANA NO. 59

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned





This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

61

TIPPECANOE COUNTY, INDIANA NO. 61

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

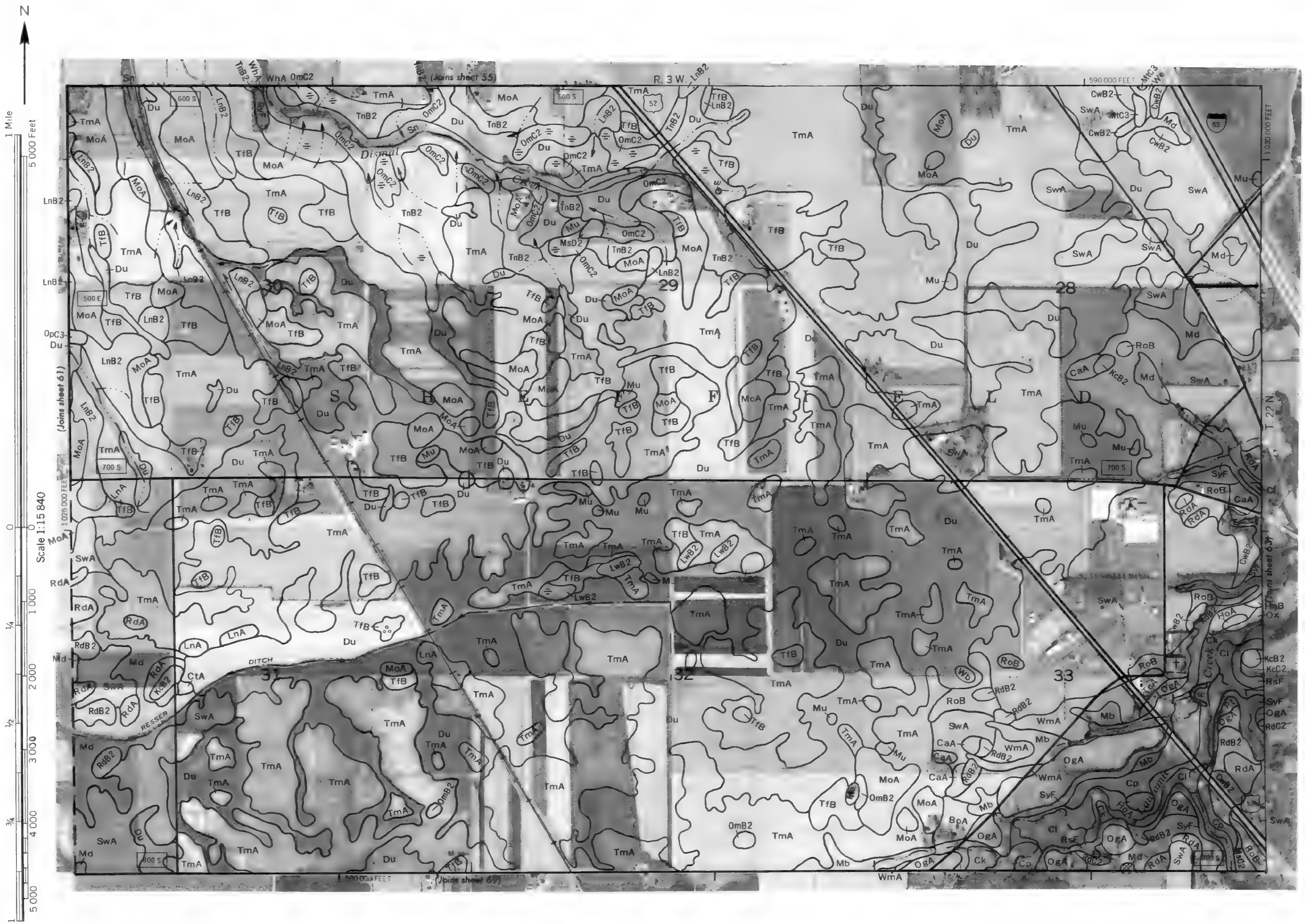
N

1 Mile

5 000 Feet

Scale 1:15 840

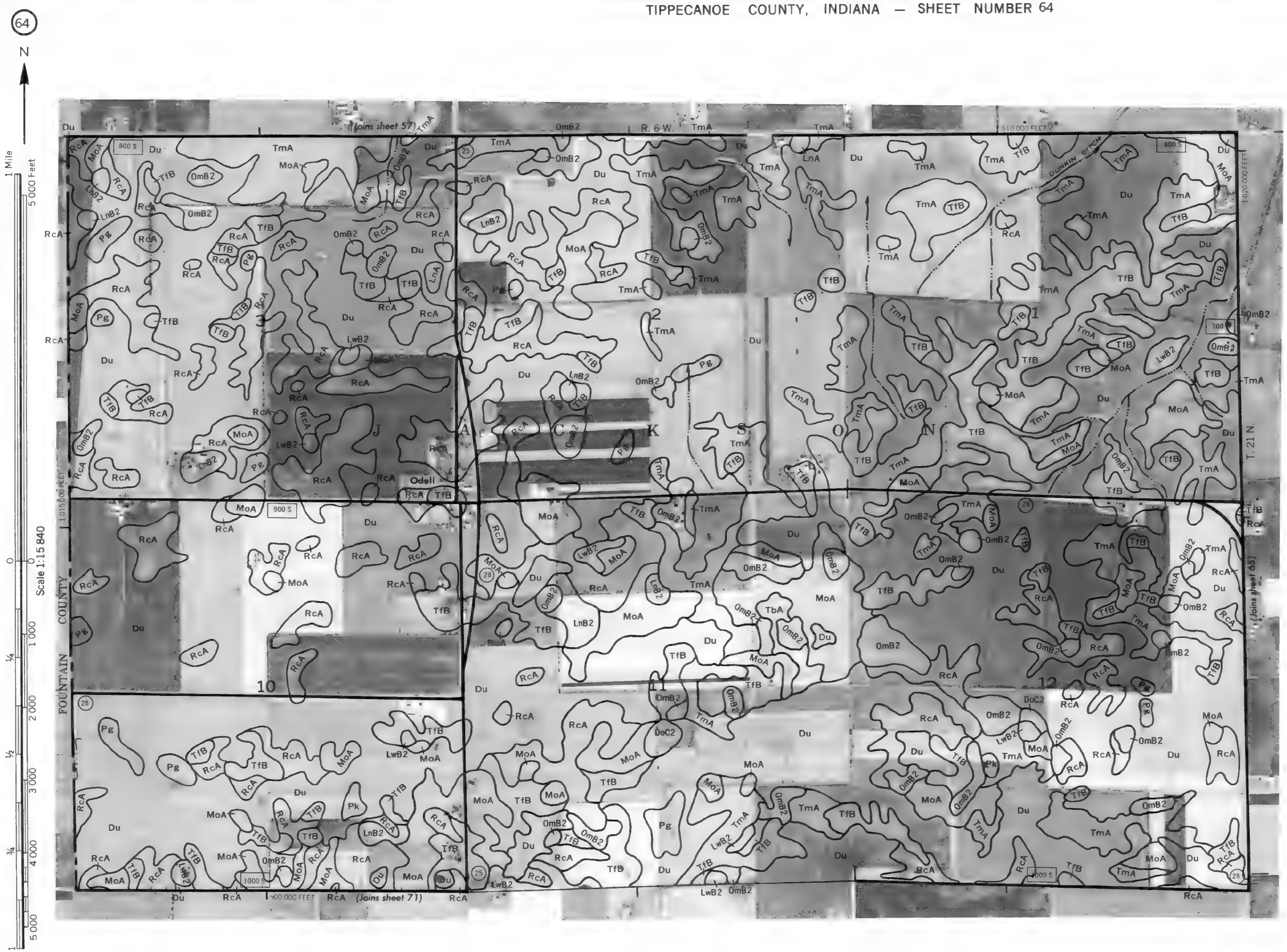
TIPPECANOE COUNTY, INDIANA — SHEET NUMBER 62



This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

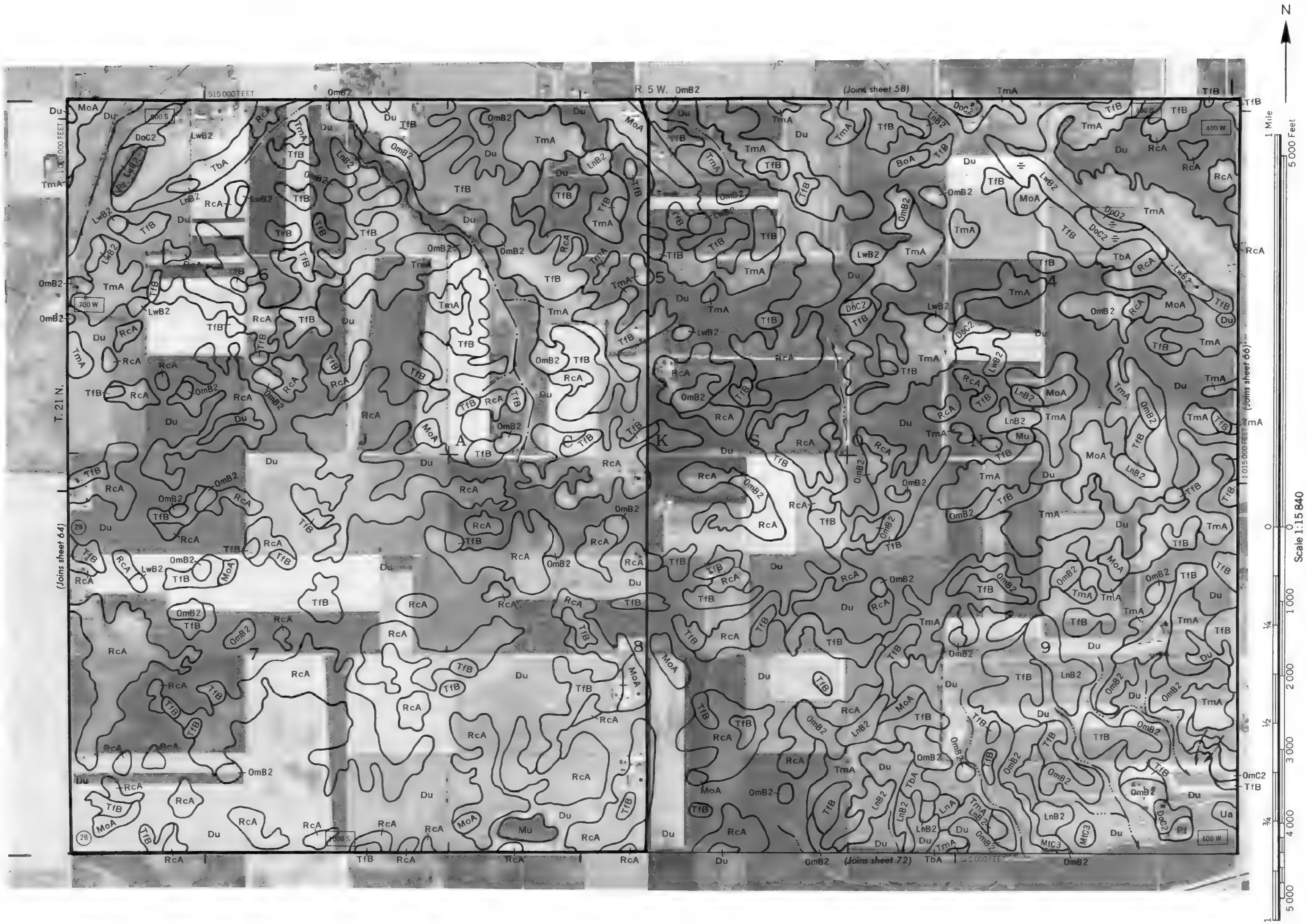
TIPPECANOE COUNTY, INDIANA NO. 63

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned

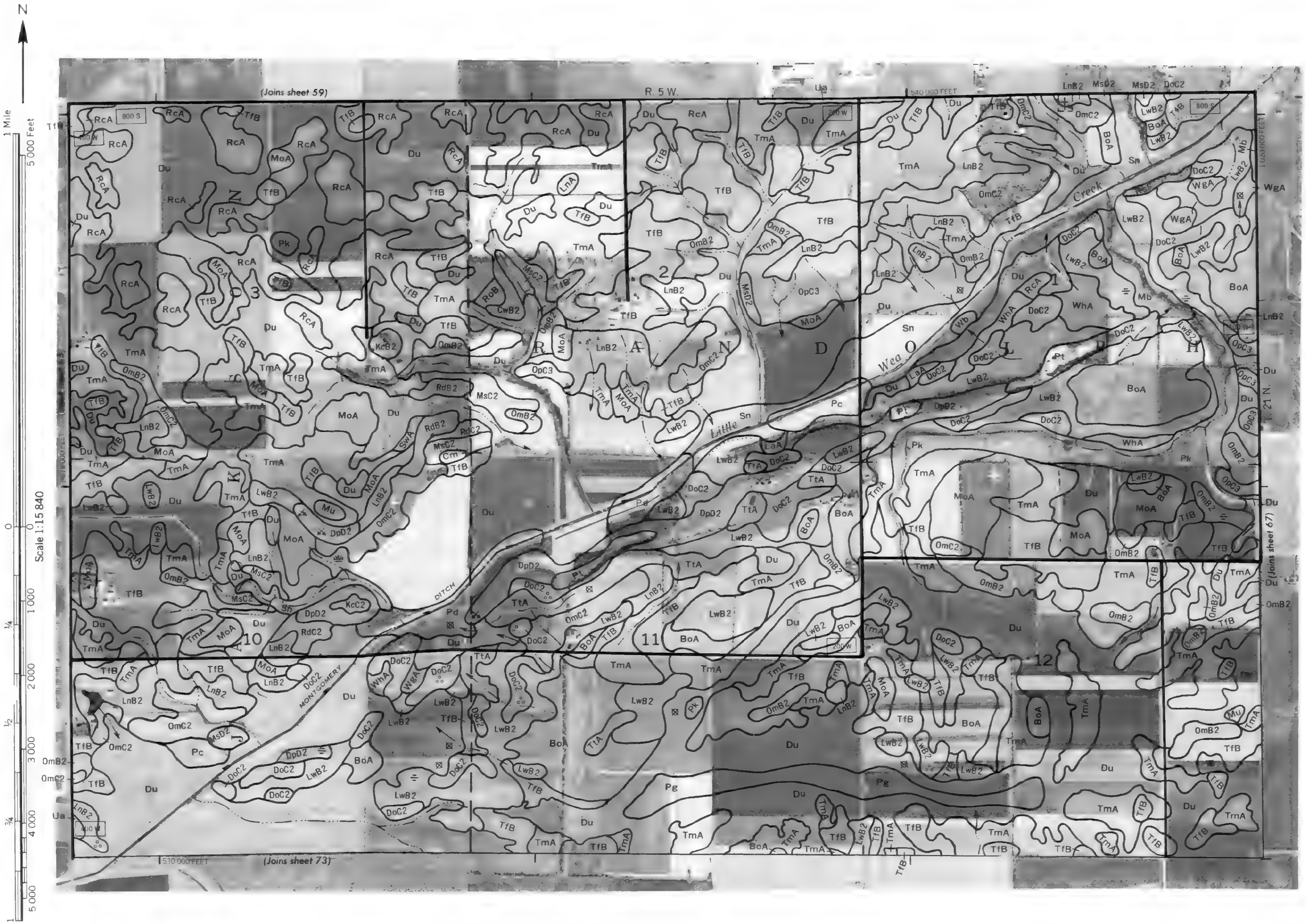
65



TIPPECANOE COUNTY, INDIANA NO. 65

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

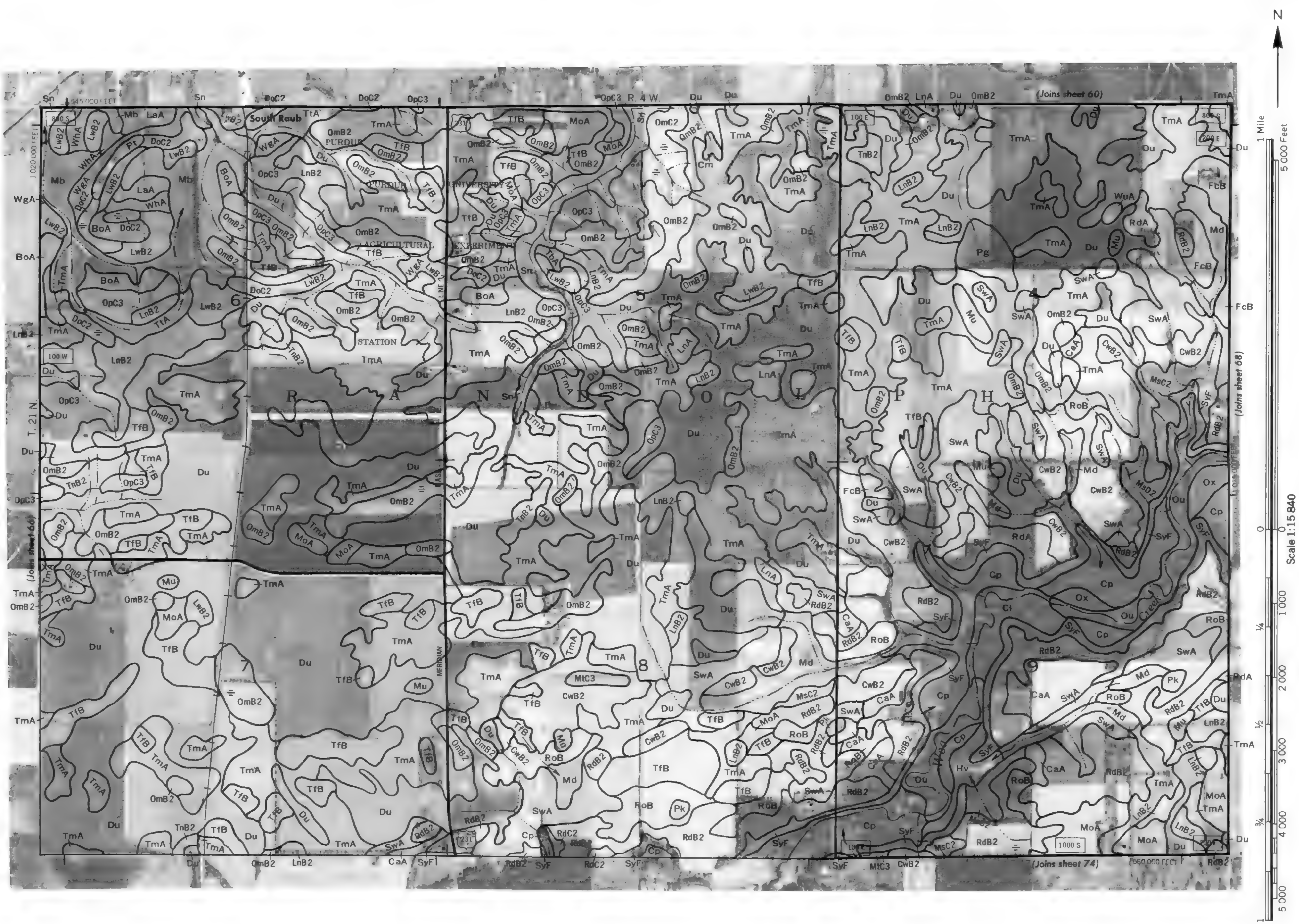
TIPPECANOE COUNTY, INDIANA — SHEET NUMBER 66



This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

TIPPECANOE COUNTY, INDIANA NO. 66

67



TIPPECANOE COUNTY, INDIANA NO. 67

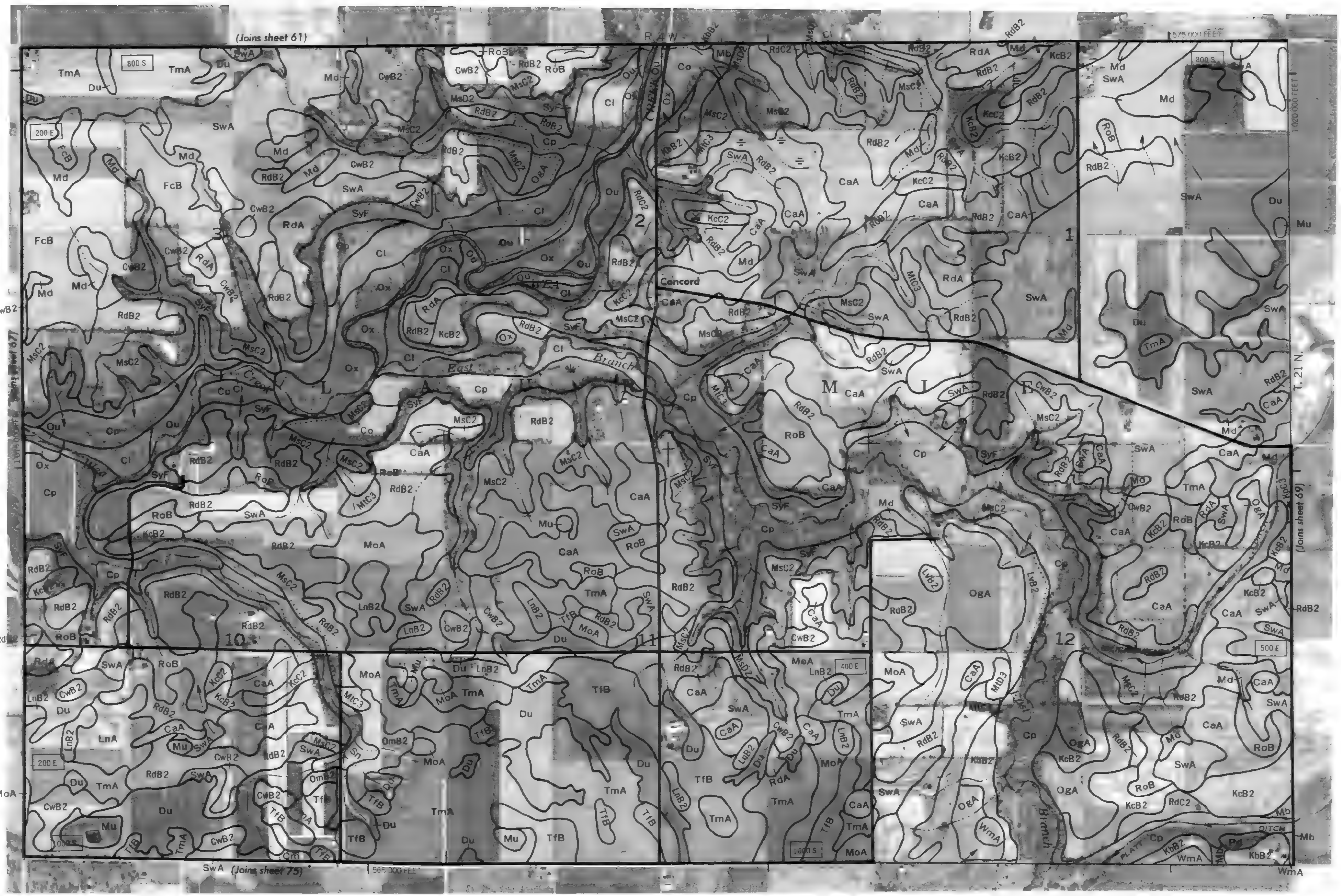
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned

N

1 Mile

5 000 Feet

Scale 1:15 840

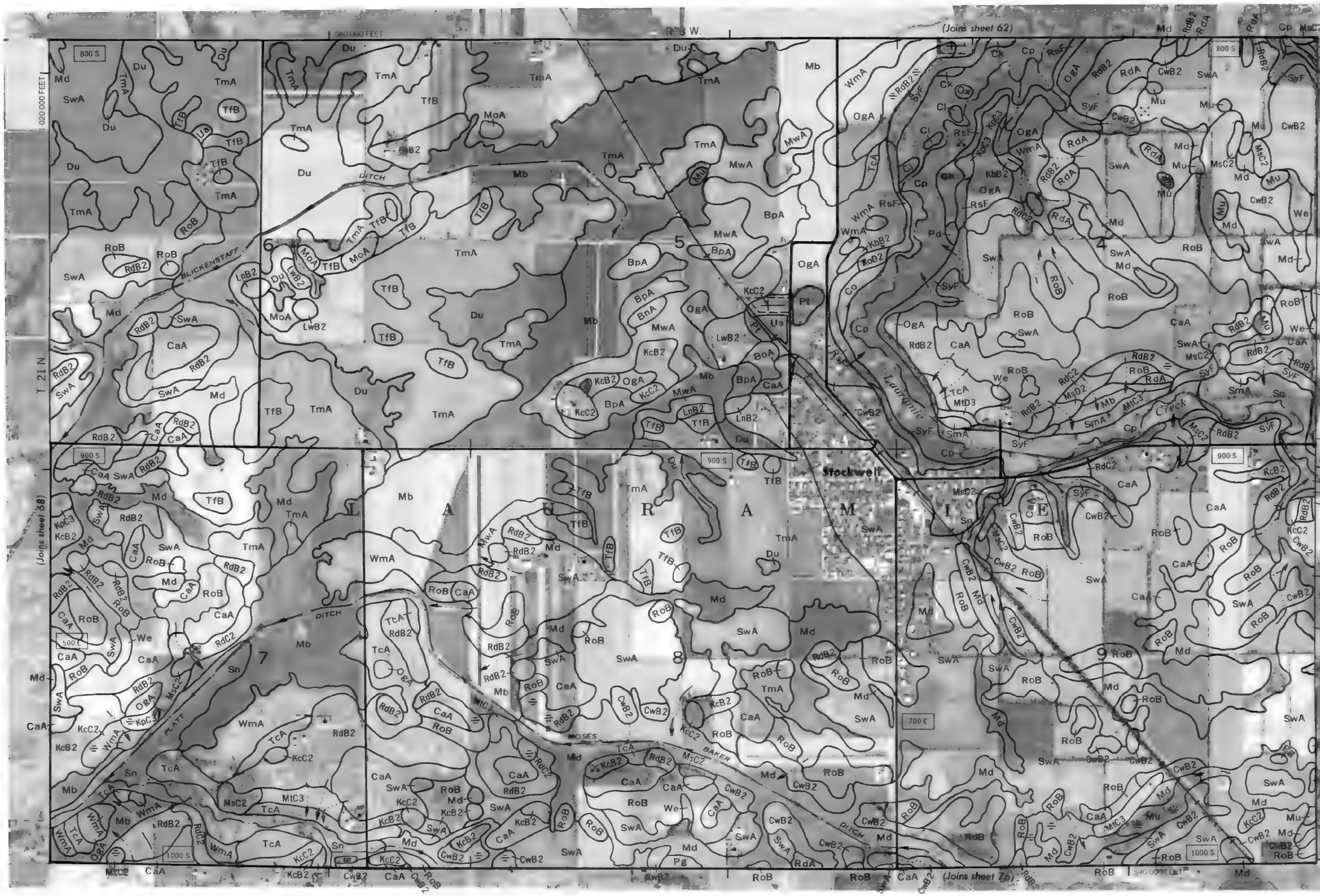


This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

TIPPECANOE COUNTY, INDIANA NO. 68

TIPPECANOE COUNTY, INDIANA NO. 69

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



N

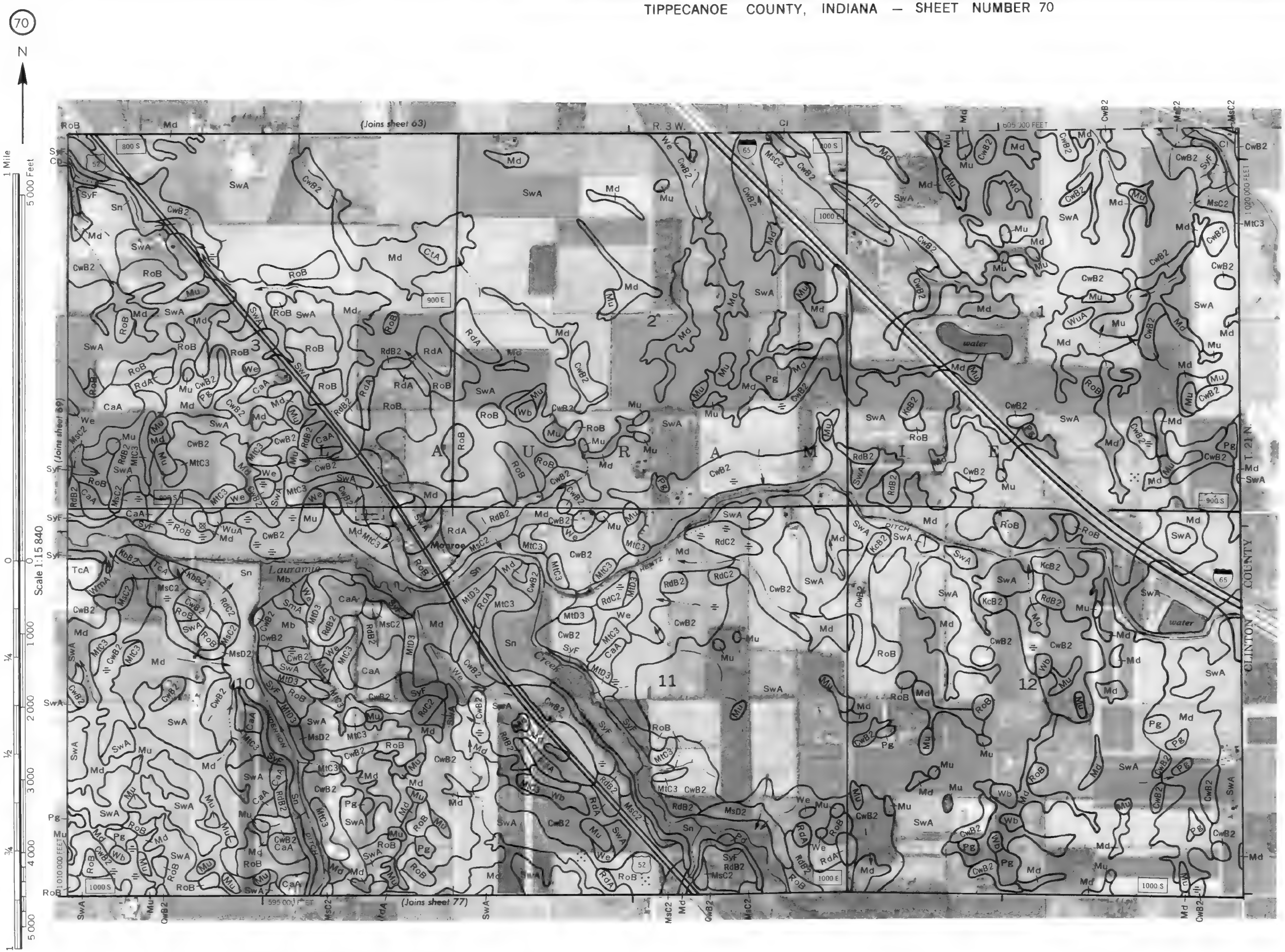
1 Mile

5 000 Feet

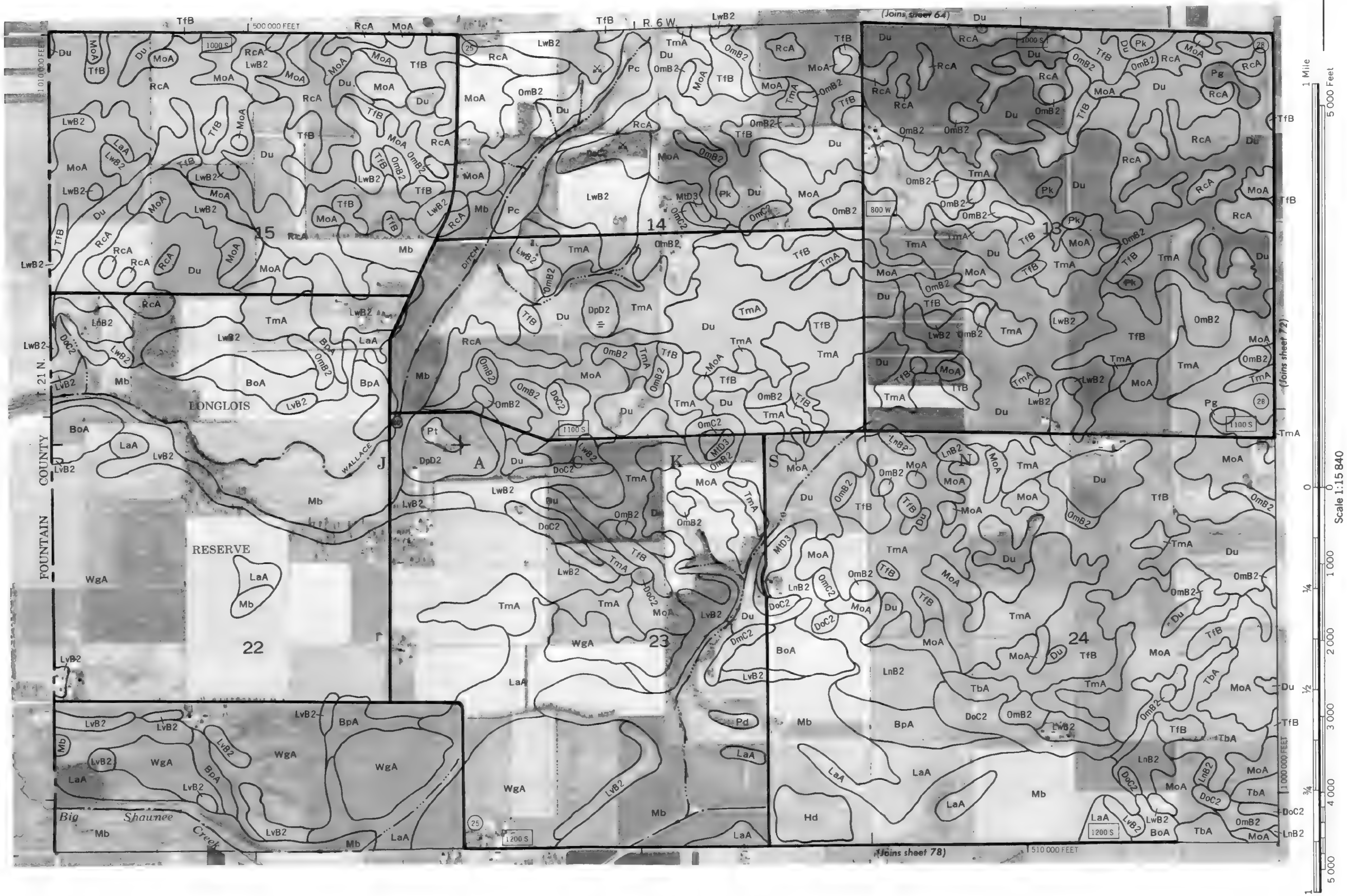
Scale 1:15 840

0 ¼ ½ ¾ 1

0 1000 2000 3000 4000 5000



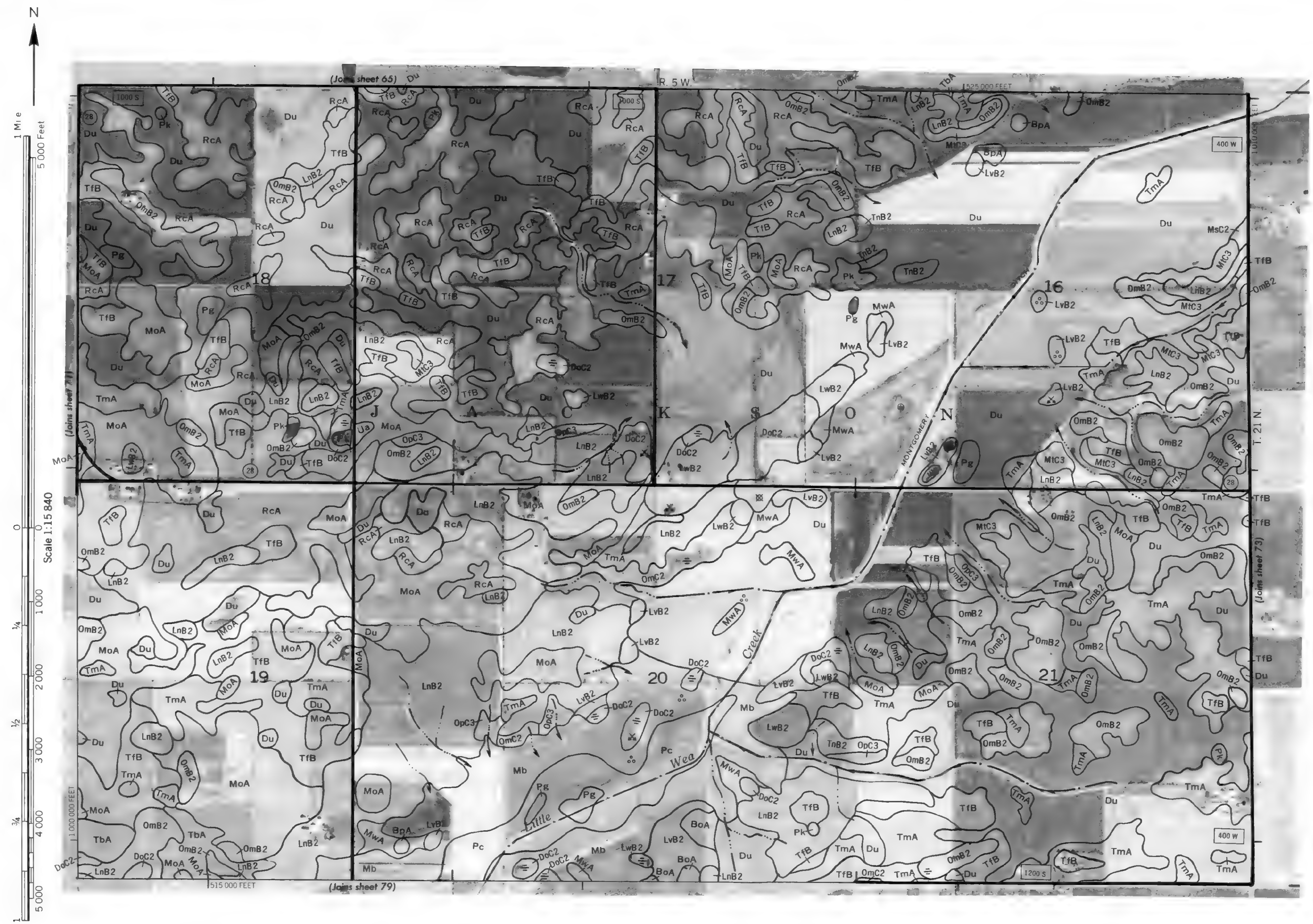
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



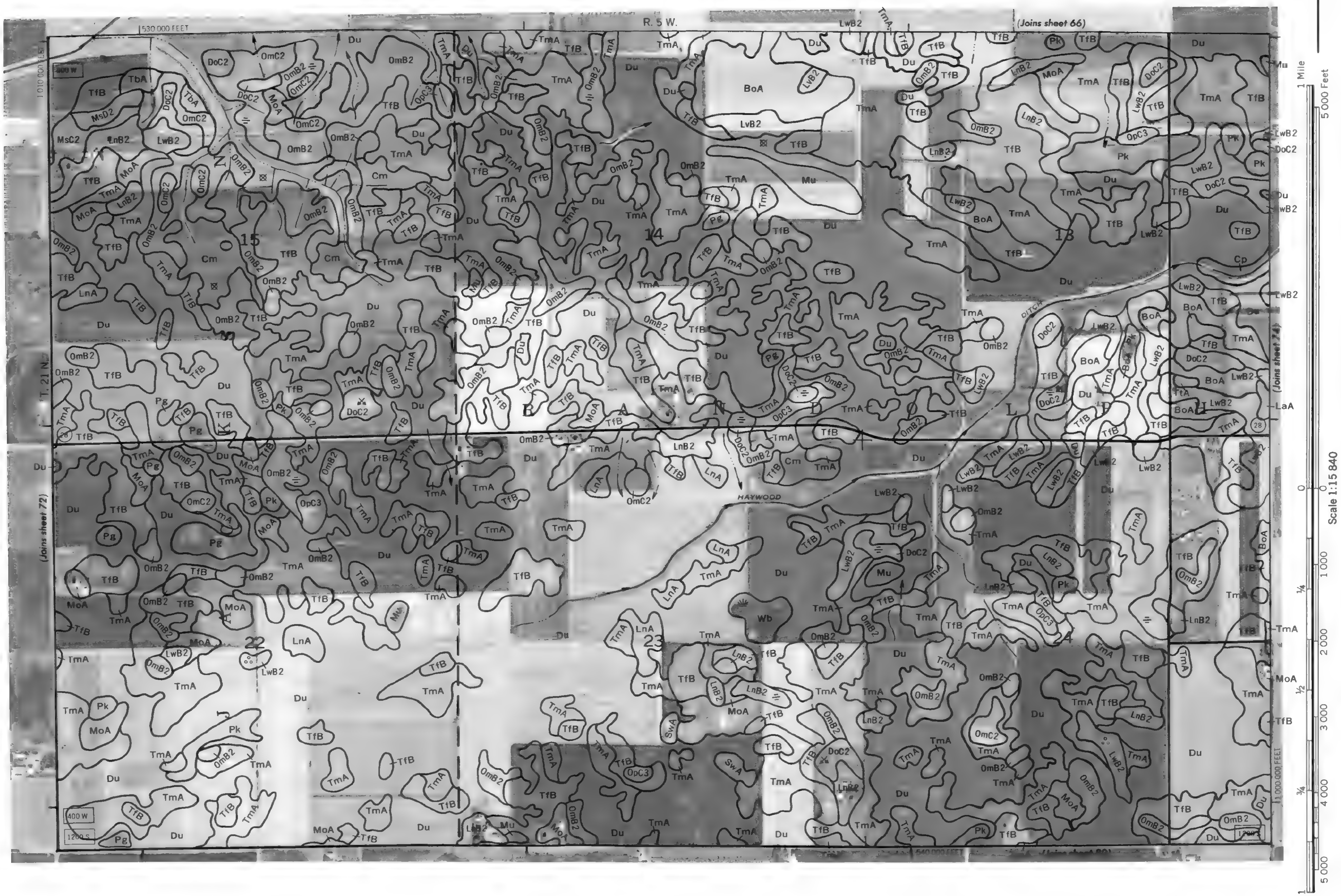
TIPPECANOE COUNTY, INDIANA NO. 71

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

TIPPECANOE COUNTY, INDIANA — SHEET NUMBER 72

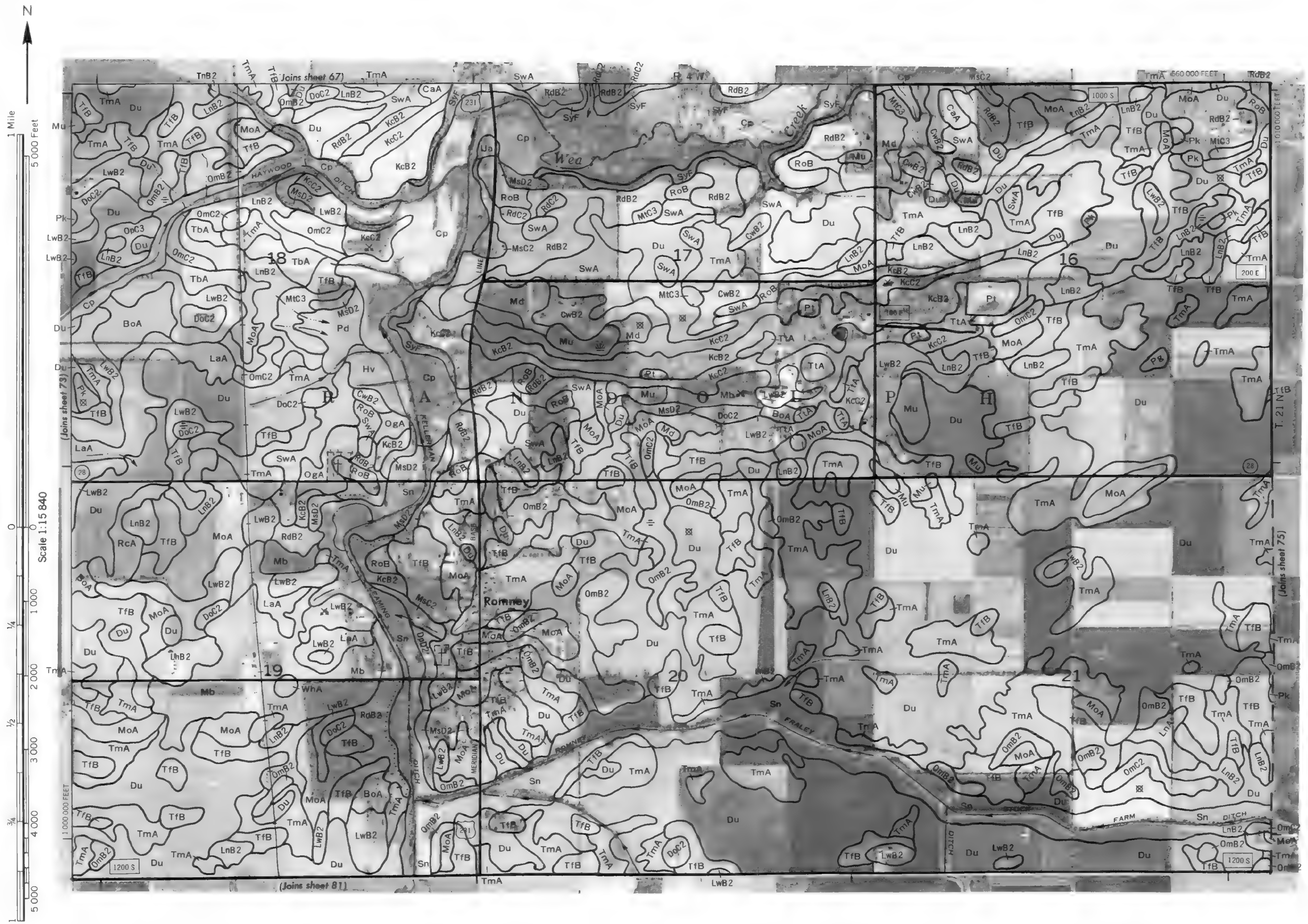


This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

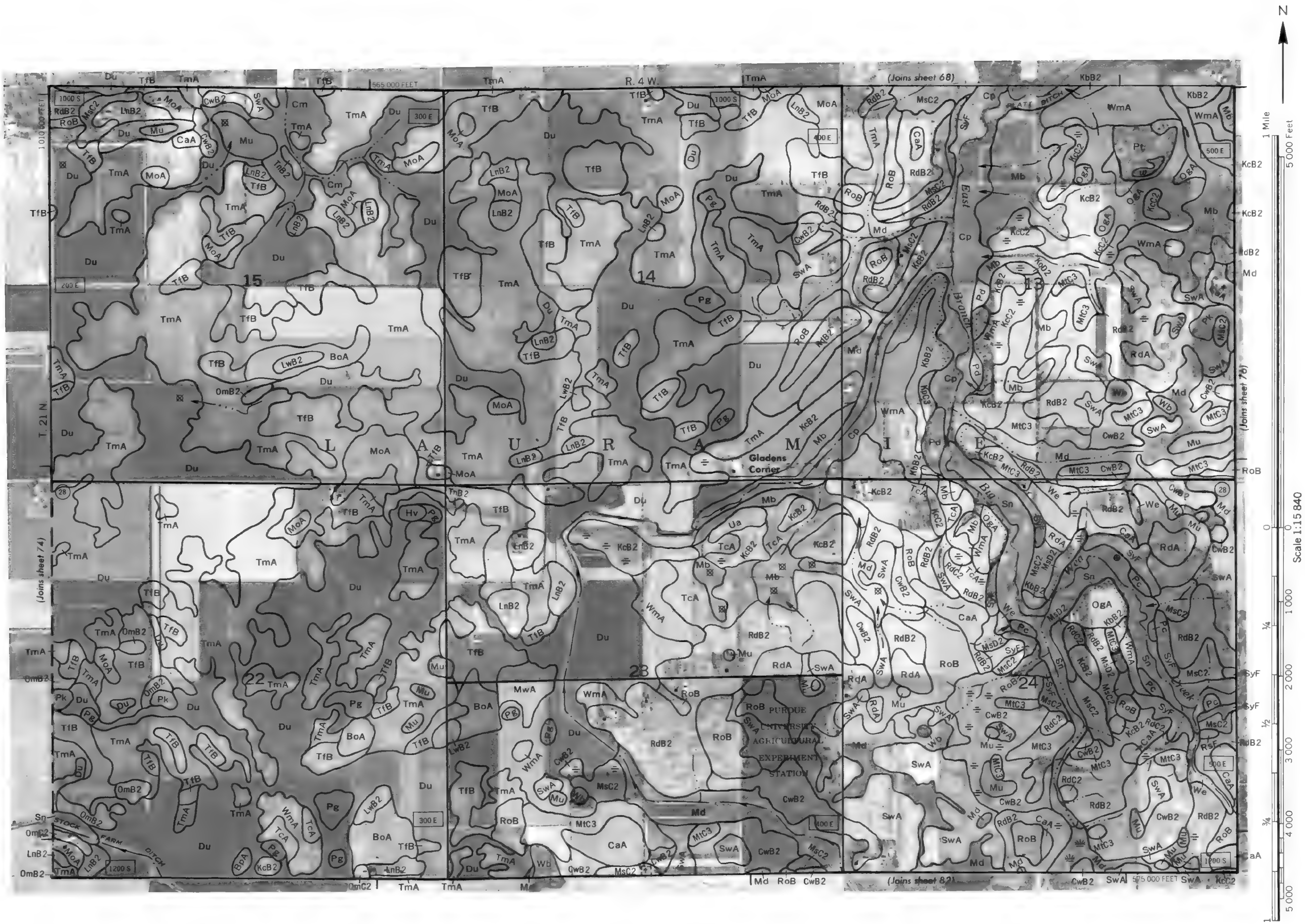


TIPPECANOE COUNTY, INDIANA NO. 73

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

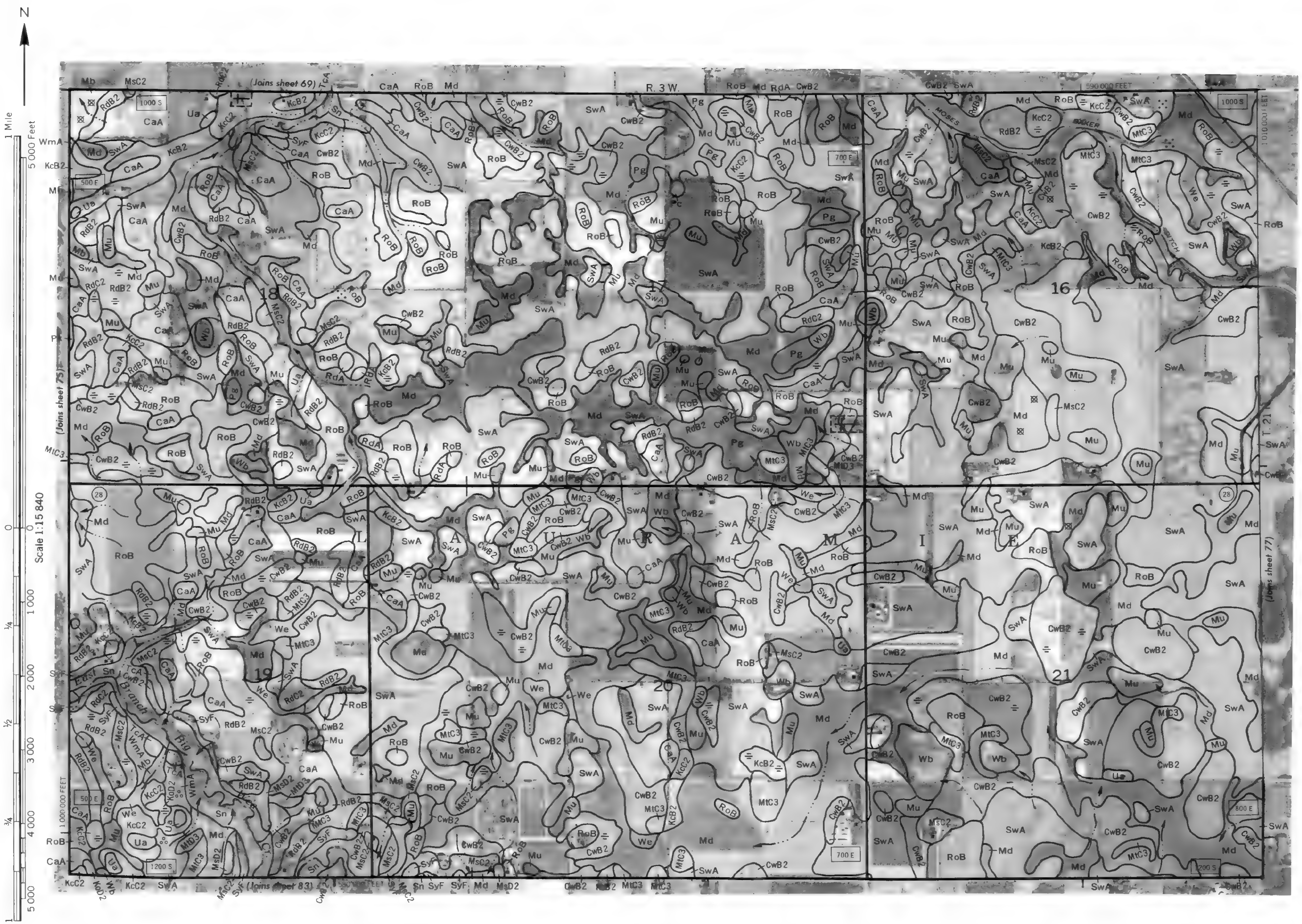


This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



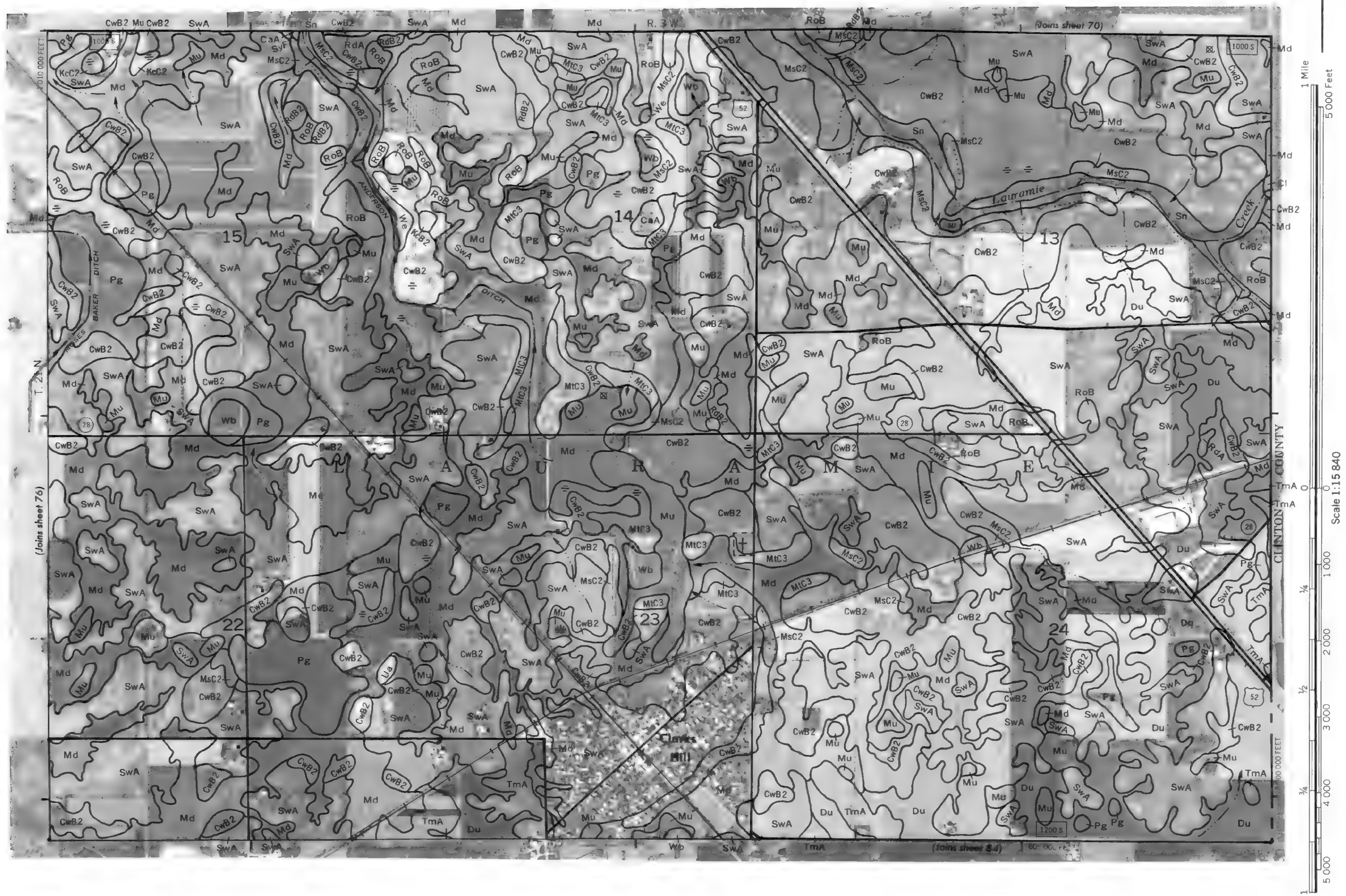
TIPPECANOE COUNTY, INDIANA NO. 75

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



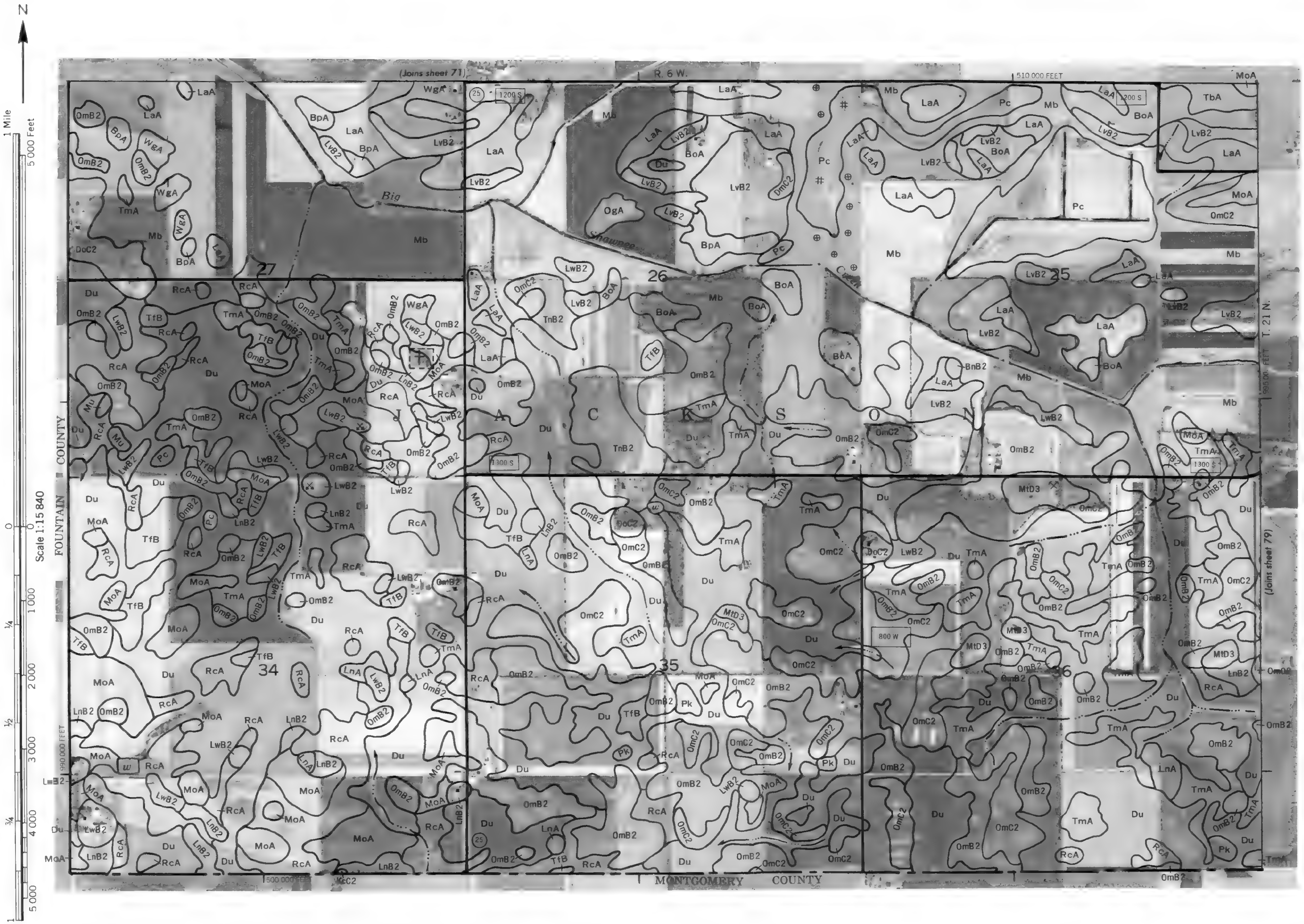
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

TIPPECANOE COUNTY, INDIANA NO. 76



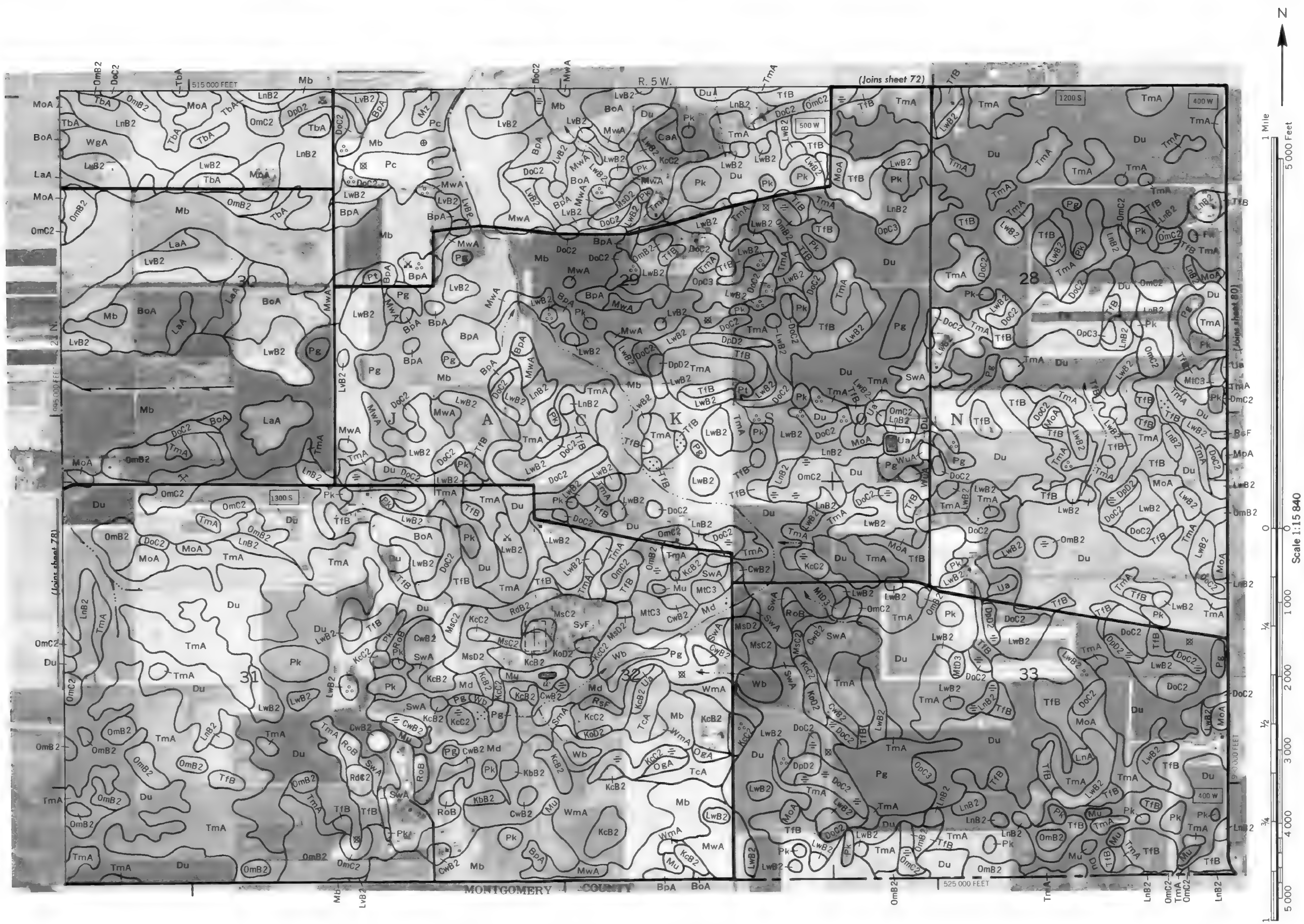
TIPPECANOE COUNTY, INDIANA NO. 77

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

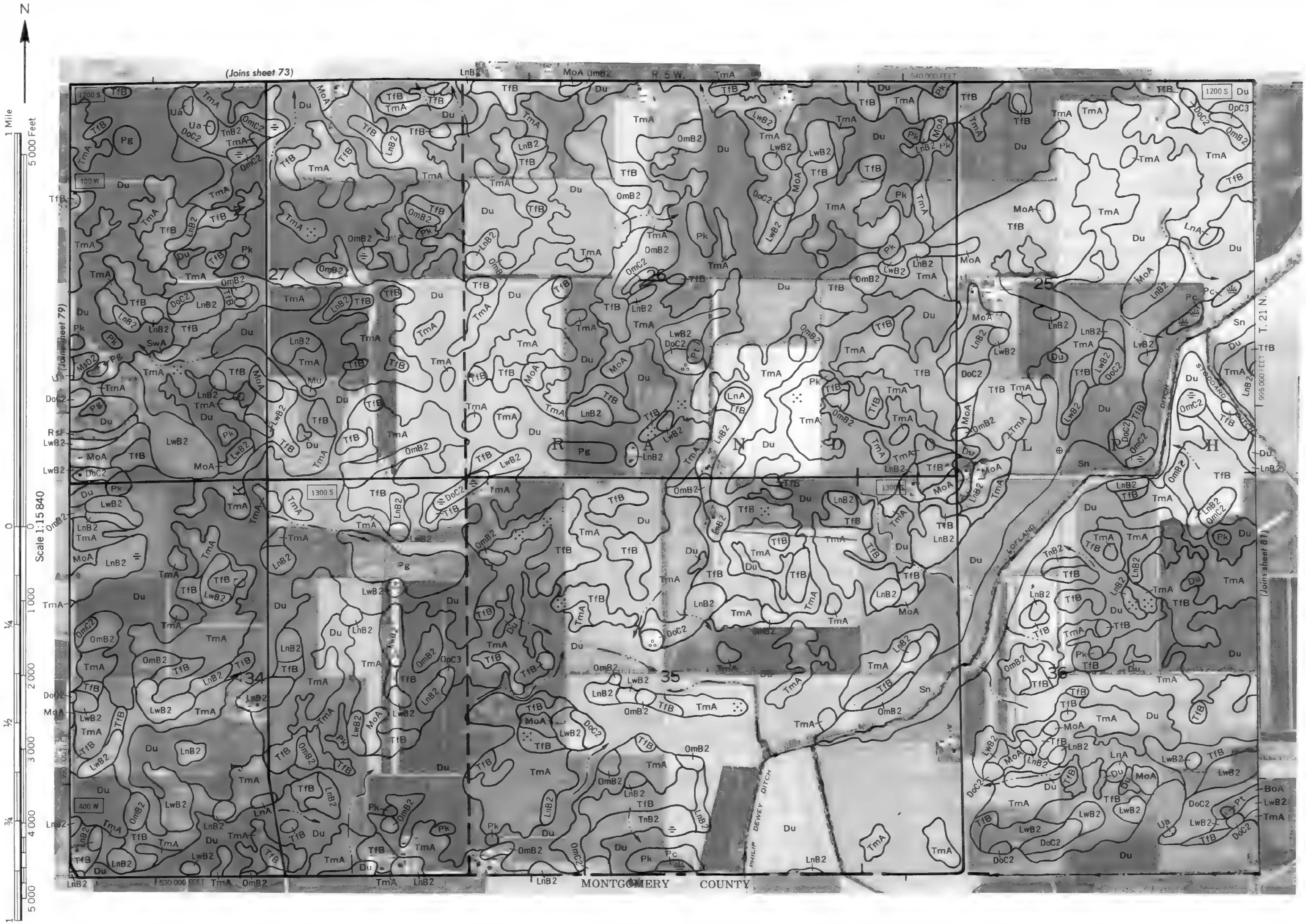
TIPPECANOE COUNTY, INDIANA NO. 78



TIPPECANOE COUNTY, INDIANA NO. 79

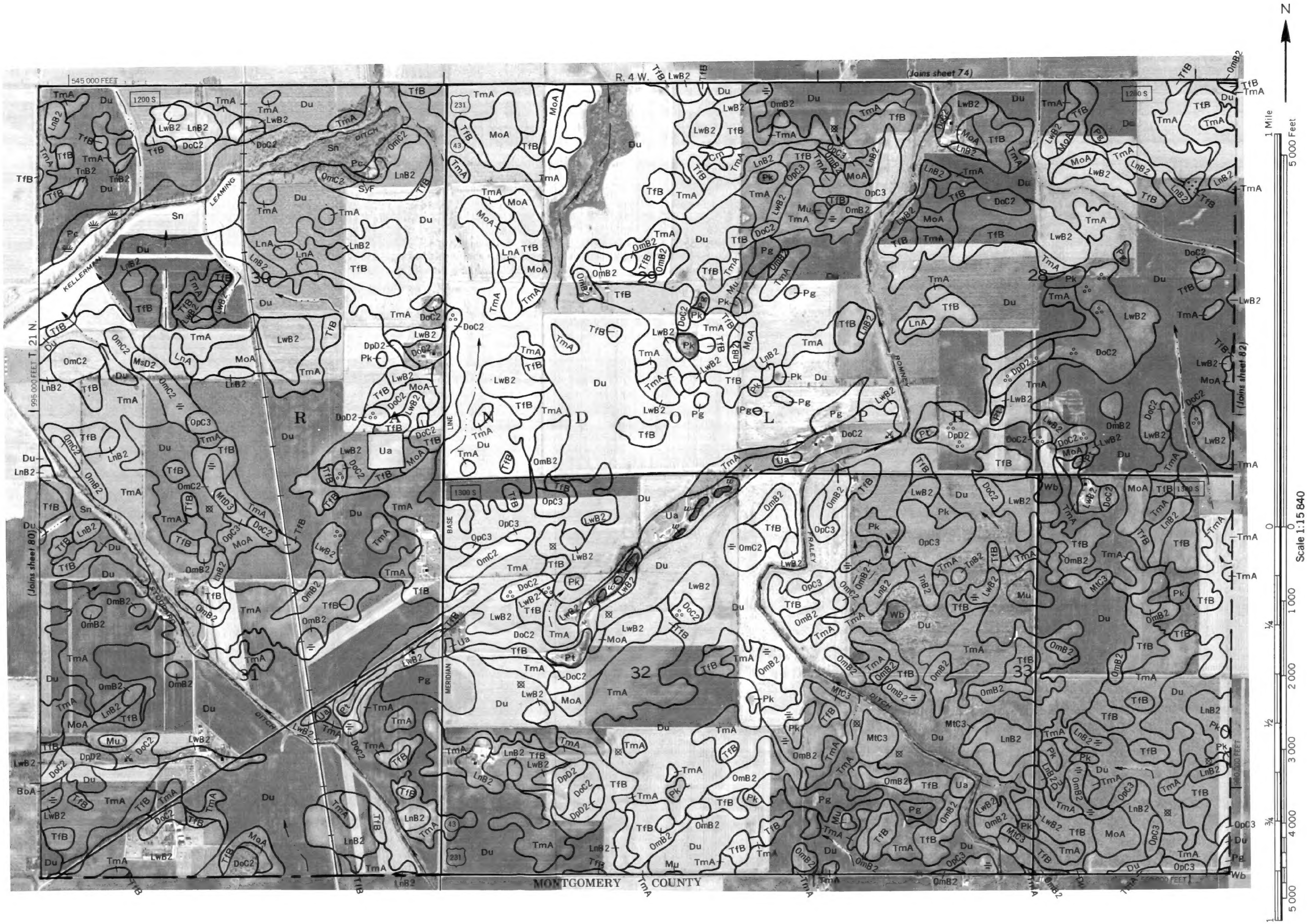
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

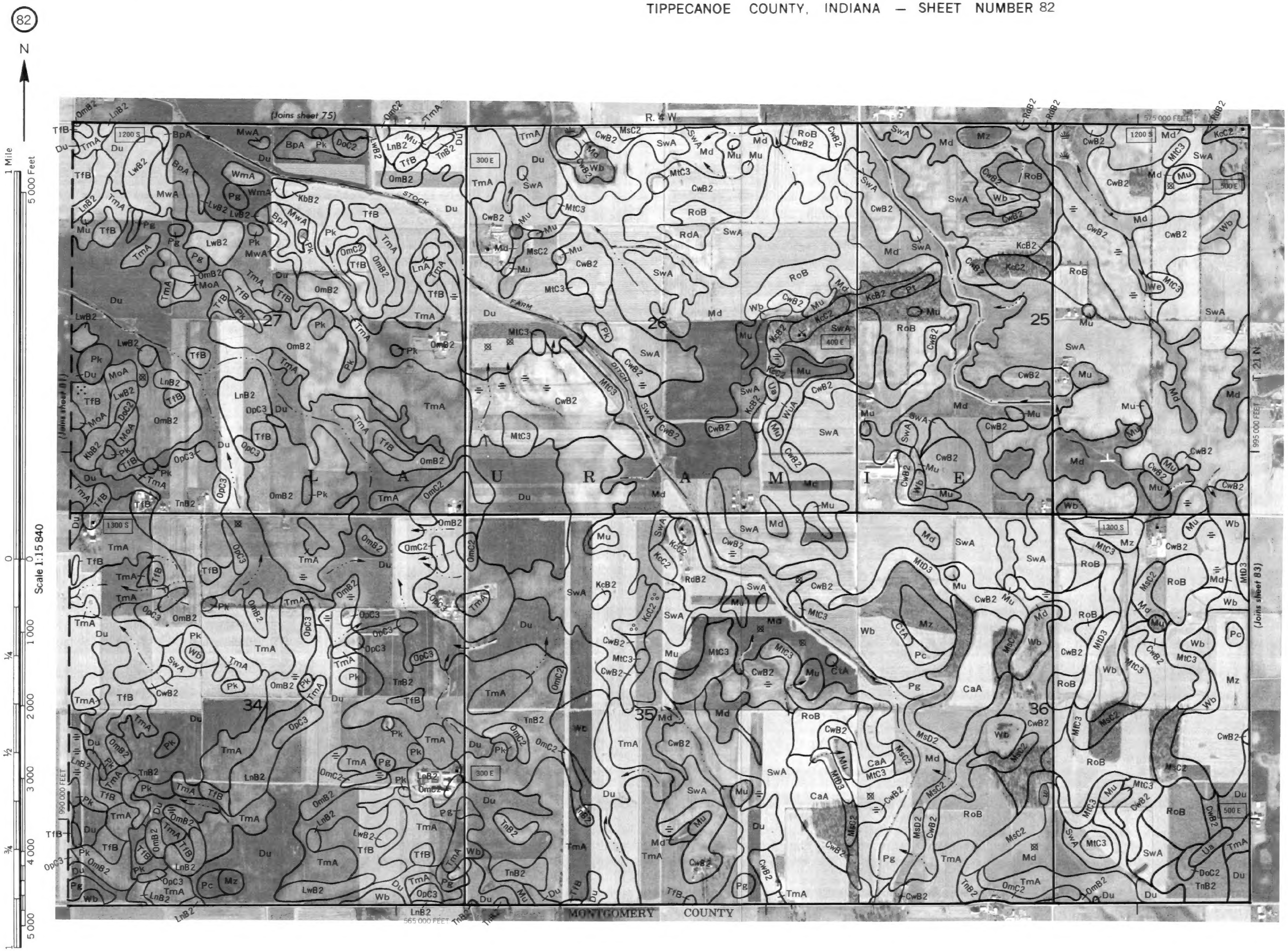
TIPPECANOE COUNTY, INDIANA — SHEET NUMBER 80



This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

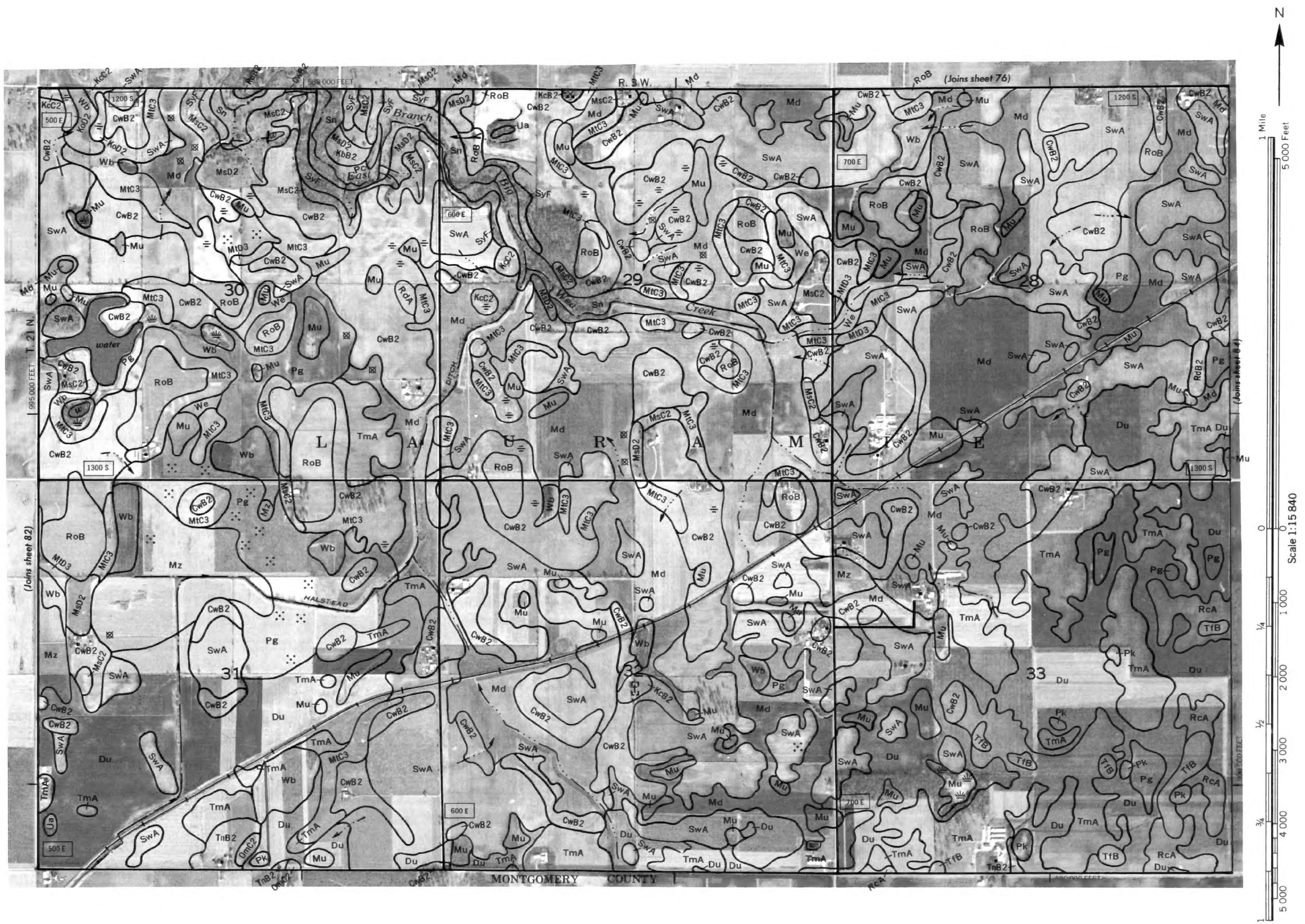
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.





This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

TIPPECANOE COUNTY, INDIANA NO. 82



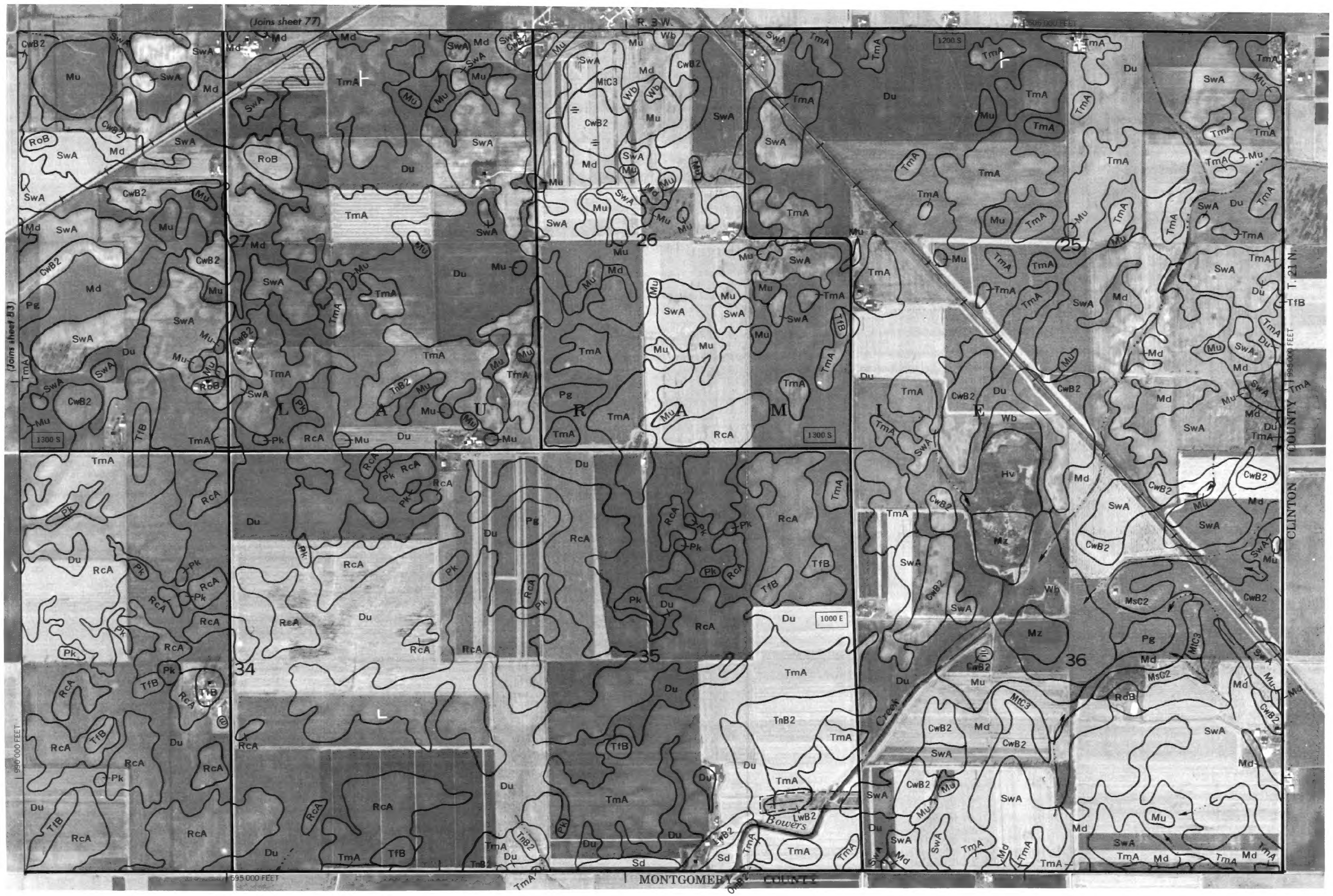
TIPPECANOE COUNTY, INDIANA NO. 83

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned

TIPPECANOE COUNTY, INDIANA — SHEET NUMBER 84

N

1 Mile
5 000 Feet
Scale 1:15 840



This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

TIPPECANOE COUNTY, INDIANA NO. 84